National Transportation Safety Board ACCIDENT FILE CONTENTS	PAGE 1 OF 2 PAGES
Transportation Mode: [X] AVIATION [ ] HIGHWAY [ ] PIPELINE [ ] INTERMODAL [ ] MARINE [ ] RAILROAD	NTSB FILE NO

IDENTIFICATION OF ACCIDENT

New Orleans, Louisiana
Boeing 737-300, N75356
05/24/88
FTW 88-[redacted]-A109

Tm
9-10-90

ITEM NO	DESCRIPTION OF ITEM	NO. OF PAGES DOC	B&W PHOTO	COLOR PHOTO
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NATIONAL TRANSPORTATION SAFETY BOARD
ACCIDENT FILE CONTENTS

TRANSPORTATION MODE: [X] AVIATION [ ] HIGHWAY [ ] PIPELINE [ ] INTERMODAL [ ] MARINE [ ] RAILROAD

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New Orleans, Louisiana
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05/24/88
FTW 88-M-A109

ITEM NO.	DESCRIPTION OF ITEM	NO. OF PAGES DOC.	B&W PHOTO	COLOR PHOTO
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20.	Statement of Party Representatives	8		
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Factual Report, Aviation, NTSB Form 6120.4

FACTUAL REPORT
AVIATION
ACCIDENT/INCIDENT

National Transportation Safety Board
Washington, D.C. 20594

NTSB Form 6120.4

Instructions

Unless otherwise stated in the instructions or on the form, all data fields must be completed. Each data field requires either a direct entry or the entry of one or more x's in appropriate blocks that best describe the mishap circumstances. Multiple entry fields may require two or more responses. Enter all applicable responses in multiple entry fields. When the selections offered are inappropriate, a two digit "other" code shall be entered in the space that follows the word "other." Do not make additional remarks in the margins as the automated data processor is not programmed to accept them. Any information which is needed to outline the sequence of events which preceded the occurrence, to support probable cause determination or which is pertinent to crashworthiness studies should be addressed in the narrative report.

"Other" Codes

01	Limited access to and/or limited time available at site.
02	Aircraft not recovered/missing.
03	Part/component not recovered/not located.
04	Aircraft too badly damaged to determine.
05	Part/component too badly damaged to determine.
06	Information not pertinent to accident/incident.
07	Applicable personnel could not provide information or information not available to applicable personnel.
08	Applicable personnel would not provide information.
09	Not installed.
10	Records not located/not available.
11	Information not entered on NTSB Form 6120.1.
12	See narrative report.

Supplements

The following accident scenarios are provided to assist investigators in selecting the report forms which should supplement the basic NTSB Form 6120 4.

1. A Cessna 172 collided with a snowbank during landing goaround at an airport. Weather was not a factor. The pilot said there was no powerplant or control malfunction. The pilot and one passenger received minor injuries. The pilot had recently been certificated as a private pilot.

Complete supplemental forms F (Training and Proficiency), Q (Airport) and S (Occupant list). A "Limited" investigation should be completed.

2. A PA-31, being operated by two pilots under FAR 135, crashed into a tower while being vectored to intercept the localizer at the destination airport. The PA-31 struck the tower while being operated at an assigned altitude. Flight was in IMC. There were two fatal injuries and three serious injuries. CFR personnel responded and treated the injured.

This accident requires an onscene investigation. Thus supplement A (Wreckage documentation), B (Cockpit documentation) and I (Crash kinematics) are required. Supplements E (Second pilot), F (Training and Proficiency) and U are required because of the two pilot FAR 135 operation (even though proficiency may not be at issue). S is needed to list the occupants; T, to document the CFR activity and P, to cover the possible ATC involvement. R (Meteorology) is required to document the weather conditions. Copies of supplements K and L would be required to document injury/toxicology and seat/restraint damage information, respectively.

National Transportation Safety Board

FACTUAL REPORT AVIATION

1 NTSB Accident/Incident Number: FTW88IA109

2 1 [ ] Accident 2 [X] Incident

3 Investigation 1 [X] NTSB 2 [ ] FAA Delegated

4 Aircraft Registration Number	5 Flight Number	For collision between aircraft, enter reg no and flt no for other aircraft	6 Aircraft Registration Number	7 Flight Number
N75356	110 / Other			A Other 06

8 Nearest City/Place	9 State	10 Zip Code (First 5 numbers only)	11 Accident Site Elevation
New Orleans	LA	70189	0 Feet MSL

12 Date of Accident (Nos for M. D. Y)	13 Day of Week (First 2 letters)	14 Local Time (24 hour clock)	15 Time Zone
05/24/88	TU	1255	CDT

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident

HISTORY OF FLIGHT

On May 24, 1988, at 1255 central daylight time, a Boeing 737-300, N75356, landed safely, gear down, during a forced landing on a flood control levee in New Orleans, Louisiana, following a loss of power on both engines as the airplane was descending through 16,500 feet. The dual engine flameout occurred as the airplane encountered moderate turbulence, lightning, and heavy rain associated with a Video Integrator Processor (VIP) level 4 imbedded thunderstorm. The airplane, owned by Polaris Aircraft Leasing, being operated by TACA International Airlines, S.A. as TACA flight 110, and flown by a professional crew, had departed Belize City, Belize at 1055 CDT, on a 14 CFR Part 129 scheduled international air carrier flight. An IFR flight plan was filed and in effect and VMC conditions prevailed at the time of the landing, however, IMC conditions prevailed at the time of the power loss. None of the 3 flight crew members, 4 flight attendants or 38 passengers were injured during the incident or the subsequent evacuation.

The flight from Belize City was uneventful until its arrival in the New Orleans terminal area. The crew stated that they observed thunderstorms on their weather radar and requested vectors around the heaviest weather. The TRACON controller, who also observed the thunderstorms, indicated that the flight should deviate to the right, which the crew did. As they began their descent from flight level (FL) 350, the crew noted green and yellow returns on the radar with some isolated red cells to the left and right of their intended flight path. Prior to entering the clouds at 30,000 feet, the captain selected the engine ignition to continuous and activated the engine anti-ice to both engines. The descent was flown with the flight management system configured for LNAV and VNAV with the autothrottles engaged. The crew flew the airplane in solid IFR conditions from 30,000 feet until they broke out at about 3,000 feet.

Additional Persons Participating in this Accident/Incident Investigation (Name, address, affiliation. Continue on page 2 if necessary)

Mr. John Abel
FAA SW-FSDO-BTR
Baton Rouge, LA

John G. Young - NTSB
Allen E. Lebo - NTSB
James C. McLean - NTSB
Laura Levy - NTSB

Thomas Jacky - NTSB
Jeffrey Gorney - NTSB
James R. Cash - NTSB
Dennis Grossi - NTSB

Investigated By:

17 Date (Nos. for M, D, Y)	18 Agency	19 Name/Signature
09/07/90	NTSB Dallas/Fort Worth Regional	[redacted] Warren V. Wandel

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 8 I A 1 ∅ 9

16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

According to the crew, they encountered heavy rain, hail, and moderate turbulence while descending at the turbulence penetration speed of 280 knots. At about 16,500 feet, both engines lost power and radar contact was lost by the New Orleans Approach controller. The loss of radar contact occurred at 1243:41 CDT. Following the power loss, the captain instructed the first officer to handle the radios and assist the observer captain, riding in the jump seat, whom the captain had instructed to attempt to restart the engines. While the observer captain and the first officer started the APU and reestablished electrical power, the captain flew the airplane using the standby attitude indicator, altimeter, and the magnetic compass and turned toward the northeast in order to exit the area of heavy weather.

The crew was able to establish APU and electrical power to the airplane at 1246:51 while it was descending through 10,600 feet. At that time the crew issued a Mayday call to New Orleans TRACON stating that they needed to get out of the weather and that they had no engine power. During the descent, the observer captain attempted windmilling restart procedures on both engines without success and at least one starter assisted attempt on each engine. The starter assisted starts were successful in lighting off both engines, however, neither would accelerate above idle and the exhaust gas temperatures went above the limits, causing the EGT lights to illuminate. The captain ordered that the engines be secured fearing that the over temperature conditions would prove catastrophic and aggravate the situation.

At that point the airplane had descended into visual meteorological conditions in scattered clouds and rain between 2,000 and 3,000 feet and the crew had resigned themselves to a two engine out forced landing. The captain later stated that he initially considered a 360° turn over Lake Borgne and ditching the airplane there, but he then sighted the Intercoastal Waterway and elected to ditch in it, as there were industrial complexes on either side and help would be much closer. Shortly thereafter, the first officer noticed a grassy area north of the waterway and pointed it out to the captain. The captain ordered the landing gear extended and called for full flaps. Using speed brakes and side slipping the airplane, the captain crossed over the vertical part of the embankment at the east end of the levee and touched down about 800 feet later. He then deployed ground spoilers, speed brakes and used the wheel brakes to stop the airplane about 2,500 feet from the initial touchdown point. The flight attendants were instructed to begin an immediate evacuation. Following the successful evacuation, the captain returned to the airplane and secured all electrical power about 5 minutes after the airplane had come to rest.

INJURIES TO PERSONS

None of the 45 occupants were injured during the incident or the subsequent evacuation. One of the passengers was recovering from an appendix operation which

Attach additional pages as necessary (Page 2a, 2b, 2c, etc.)

National Transportation Safety Board

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16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

she had two days before the flight and another suffered from a cardiac condition and high blood pressure. Both were taken to area hospitals for observation, but were released later that evening.

DAMAGE TO AIRCRAFT

The airplane received minor damage as a result of its encounter with hail during the descent. The hail damage was limited to the radome and the leading edges of the horizontal stabilizers. There was no hail damage to either engine fan section and there was no damage sustained by the airplane as a result of the off airport landing.

PERSONNEL INFORMATION

A review of the flight crew member's personnel and training records indicated that all three, including the observer captain, were properly certificated and current for the operation that was being conducted at the time of the incident. It was noted that the incident airplane was the first 300 series 737 acquired by TACA International and each of the flight crew had been through 737-300 differences training during the 60 days preceding the incident. For a complete crew history and their qualifications, please see the attached Operation's Group Report.

AIRCRAFT INFORMATION

The airplane was properly certificated in the transport category and had accumulated a total of 80.6 hours since manufacture. A review of the airplane's maintenance records and logs indicated that it had received its last "A" inspection on 5/20/88, about 9.9 hours prior to the incident and there were no open discrepancies which would have affected its airworthiness. At no time during the airplane's brief operational history had there been any reported discrepancies or equipment failure that would have contributed to the loss of engine power.

The airplane was refueled in Belize and departed with 24,000 pounds of Jet-A and there was no other service. Calculations indicated that the airplane was within its prescribed limits for weight and center of gravity, both at takeoff and at the time of the incident.

METEOROLOGICAL INFORMATION

At the time of the incident, the New Orleans weather was dominated by a trough line which extended to the southwest through central Louisiana. The 1253 CDT surface aviation observation taken at the New Orleans Lakefront Airport reported the weather as estimated ceiling 4,500 feet broken, 25,000 feet overcast, visibility 8 miles with a thunderstorm, temperature 77 degrees, dew point 71

Attach additional pages as necessary (Page 2a. 2b. 2c. etc.)

National Transportation Safety Board

FACTUAL REPORT
AVIATION

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16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

degrees, winds from 170 degrees at 10 knots, altimeter setting 29.88" Hg., with remarks-thunderstorm began at 1203 overhead through south through northwest moving east, occasional lightning in cloud and cloud to ground. The Lakefront Airport was located about 18 miles northwest of the point where the airplane experienced the power loss and about 5 miles northwest of the eventual landing site.

Weather radar data, correlated with the ATC flight track data for TACA flight 110, indicated that just prior to the loss of engine power, the flight entered an area of a level 4 echo with very heavy rain. A complete discussion of the weather conditions as they existed can be found in the Weather Group Factual Report which is attached.

The crew received a company weather briefing prior to their departure from San Salvador. They did not receive any updated weather en route and were not aware of Convective SIGMET 2C or Center Weather Advisory (CWA) 3, both of which were in effect at the time they encountered the thunderstorm. Investigation revealed that both the SIGMET and the CWA had been transmitted, but not on a frequency during the time period that flight 110 was monitoring that frequency.

COMMUNICATIONS

All communications between ATC and TACA flight 110 were normal up until it experienced the power loss at 1243:41. Prior to that time, the controller had issued one deviation for weather and authorized the crew to deviate as necessary. Communications were reacquired at 1246:51 when the crew was able to reestablish electrical power to the airplane. At the same time as voice communications were lost so was the airplane's transponder return, therefore, radar data also did not exist for the same time frame.

FLIGHT RECORDERS

The flight data recorder, a Sundstrand UFDR (serial number 3955) and the cockpit voice recorder, a Fairchild A-100A (serial number 52350) were not damaged during the incident and the recording mediums were found to be in excellent condition. The majority of the inter-cockpit conversation was in Spanish while all of the radio transmissions were in English. Where applicable in the transcript, both the English and Spanish versions were included. The translations were done by the two Spanish/English speaking members that were on the CVR group.

After the flight crew secured the airplane and prior to the arrival of the NTSB on scene, FAA personnel, who were not familiar with the operation of the CVR, applied APU power back to the airplane for a total of 19 minutes and 37 seconds during two separate occasions. This resulted in the taping over and loss of pertinent cockpit conversations and background noises during the critical portion of the flight.

Attach additional pages as necessary (Page 2a, 2b, 2c etc

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16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

WRECKAGE AND IMPACT INFORMATION

The airplane was successfully landed on the back side of flood control levee on the NASA Michoud Facility property. The levee was oriented about 070/250 degrees and ran along the intercoastal waterway. The levee itself which the airplane cleared on final was about 12 feet high and sloped downward about 30 degrees on each side. The landward side of the levee was about 8,762 feet in length between embankments and varied in width between 117 feet and 132 feet with a drainage canal on the north side which ran parallel to the levee located to the south.

Examination of the area revealed that the airplane had approached from the east, cleared the top of the levee, and then touched down on a heading of about 250 degrees, some 800 feet from the eastern base of the embankment. Following initial touchdown, the airplane tracked true down the levee, despite a slight downward slope and the wet grass, and came to rest on a heading of 252 degrees. The left main gear came to rest 2,552 feet from its initial touchdown point.

The airplane received minor hail damage to the radome, nose paint, and the leading edges of both horizontal stabilizers as a result of the encounter with the thunderstorm. The number 2 engine turbine section was severely damaged as a result of over temperature conditions which occurred during the attempted air restarts and operation in a stalled condition during the descent. The number 1 engine had no visible damage either due to hail or exposure to over temperature conditions for a prolonged period.

Following an initial examination of the airplane, which included the securing of fuel and oil samples and the borescope inspection of both engines, it was towed about 2 miles down the levee onto a private road within the NASA property. The airplane was ultimately secured on a hard stand adjacent to NASA's vertical assembly building at Michoud where it remained for the duration of the systems investigation and engine changes.

Complete aircraft systems checks and examinations were conducted. No discrepancies or damage were noted other than the damage previously discussed. Following an engine change at the number 2 position and takeoff power runs on both sides, the airplane was taken off from the private road.

MEDICAL AND PATHOLOGICAL INFORMATION

As there was no evidence of crew incapacitation in any form, toxicology samples were not requested nor taken.

Attach additional pages as necessary (Page 2a, 2b, 2c, etc.)

National Transportation Safety Board

FACTUAL REPORT AVIATION

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16 Narrative Statement of Facts, Conditions and Circumstances Pertinent to the Accident/Incident *(continued)*

SURVIVAL ASPECTS

This was a survivable accident in that there were no impact forces or fire. All of the airplane exits that were utilized operated normally as did their respective slides. All of the required over water survival equipment was aboard and found to have been properly inspected and stowed in the appropriate locations. None of the flight attendants or passengers complained about having any difficulties locating the required equipment. Likewise, they did not encounter any difficulties during the evacuation.

TESTS AND RESEARCH

As a result of this incident extensive research and testing were done on the CFM International CFM-56-3 engines that were installed on the airplane. The number 2 engine was torn down and inspected in order to determine the magnitude and origin of the over temperature damage which was observed during the field phase of the investigation. The number 1 engine was removed from the airplane prior to its return to service and subjected to extensive flight and ground testing to determine its water ingestion capacity. The water ingestion testing confirmed that the CFM-56-3 exceeded the 14 CFR Part 33 certification requirements. However it was proven that at both approach idle and flight idle power settings the engine speed would decrease below the minimum self-sustaining speed when water ingestion was increased to those rates that were likely to be encountered in VIP level 4 and 5 thunderstorms. This was found to be true even though partial combustion continued in the combustor. In engines tested to that point, advancement of the power lever would not cause the engine to accelerate and the exhaust gas temperature would rise significantly, to the point of causing over temperature damage similar to that found in the incident number 2 engine.

Please see the Powerplant Group Chairman's factual report for a complete discussion of the teardown examination and testing results and the remedial measures that were taken to eliminate the flameout occurrences.

ADDITIONAL DATA

ELT: The airplane was equipped with a Dayton Granger Dolphin EB-2BW beacon, serial number 39092, which had a battery expiration date of 5/7/89. The unit was armed, but did not activate due to the low "G" forces that were encountered.

Wreckage Release: The airplane was released on 6/6/88. All of the retained components were either returned or disposed of at the end of the investigation as per the operator's instructions.

Attach additional pages as necessary (Page 2a, 2b, 2c, etc) degrees, winds from 170 degrees at 10 knots, altimeter setting 29.88" Hg., with remarks-thunderstorm began at 1203 overhead through south through northwest moving east, occasional lightning in cloud and cloud to ground. The Lakefront Airport was located about 18 miles northwest of the point where the airplane experienced the power loss and about 5 miles northwest of the eventual landing site.

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FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

FTW88IA109

Airport/Approach/Landing Information

24 [ ] Not applicable *(Go to block 39)*

25 Airport Name
A Other DG

26 Airport Identifier

27 Accident Location
1 [X] Off airport/airstrip
2 [ ] On airport
3 [ ] On airstrip
A Other

28 Distance From Airport Center *(Nearest SM)*
5 SM
A Other

29 Direction From Airport
120 °mag
A Other

30 VFR Approach/Landing *(Multiple entry)*
1 [ ] None
2 [ ] Traffic pattern
3 [X] Straight-in
4 [ ] Valley/terrain following
5 [ ] Go around
6 [ ] Touch and go
7 [ ] Full stop
8 [ ] Stop and go
9 [ ] Simulated forced landing
10 [X] Forced landing
11 [ ] Precautionary landing
A Other

31 Type Instrument Approach Flown *(Multiple entry)*
1 [X] None
2 [ ] ADF/NDB
3 [ ] SDF
4 [ ] VOR/TVOR
5 [ ] VOR/DME
6 [ ] TACAN
7 [ ] ILS-complete
8 [ ] ILS-localizer
9 [ ] ILS-backcourse
10 [ ] RNAV
11 [ ] MLS
12 [ ] LDA
13 [ ] ASR
14 [ ] PAR
15 [ ] Sidestep
16 [ ] Visual
17 [ ] Contact
18 [ ] Circling
19 [ ] Practice
A Other

32 Runway Used Identifier
A Other DG

33 Runway Length
Feet
A Other DG

34 Runway Width
Feet
A Other DG

35 Airport Elevation
Ft. MSL
A Other DG

36 Runway/Landing Surface
1 [ ] Macadam
2 [ ] Asphalt
3 [ ] Concrete
4 [ ] Gravel
5 [ ] Dirt
6 [X] Grass/turf
7 [ ] Snow
8 [ ] Ice
9 [ ] Water
10 [ ] Metal/wood
A Other

37 Runway/Landing Surface Condition
1 [ ] Dry
2 [X] Wet
3 [ ] Ice covered
4 [ ] Snow—dry
5 [ ] Snow—wet
6 [ ] Snow—crusted
7 [ ] Snow—compacted
8 [ ] Vegetation
9 [ ] Water—calm
10 [ ] Water—choppy
11 [ ] Water—glassy
12 [ ] Rubber deposits
13 [ ] Soft
14 [ ] Rough
15 [ ] Slush covered
16 [ ] Holes
A Other

If accident occurred during approach, departure or on airport, see instructions for completing Supplement Q.

Aircraft Information

39 Aircraft Manufacturer
Boeing

40 Aircraft Model/Series
737-3T0

41 Serial No.
23838
A Other

42 Certificated Maximum Gross Weight
135,500
A Other

43 Type of Aircraft
1 [X] Airplane
2 [ ] Helicopter
3 [ ] Glider
4 [ ] Balloon
5 [ ] Blimp/dirigible
6 [ ] Ultralight
7 [ ] Gyroplane
A Specify

44 Type Airworthiness Certificate *(Multiple entry)*
Standard
1 [ ] Normal
2 [ ] Utility
3 [ ] Acrobatic
4 [X] Transport
Special
5 [ ] Restricted
6 [ ] Limited
7 [ ] Provisional
8 [ ] Special flight
9 [ ] Experimental
A Other

45 Home Built
1 [ ] Yes
2 [X] No
A Other

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number: FTW88IA1Ø9

Aircraft Information (continued)

46 Landing Gear *(Multiple entry)*
1 [ ] Tricycle—fixed
2 [X] Tricycle—retractable
3 [ ] Tailwheel—all fixed
4 [ ] Tailwheel—all retractable
5 [ ] Tailwheel—retractable mains
6 [ ] Amphibian
7 [ ] Hull
8 [ ] Float
9 [ ] Emerg. float
10 [ ] Ski
11 [ ] Ski/wheel
12 [ ] Skid
13 [ ] High Skid
A Other

48 No. of Seats 146
A Other

49 Stall Warning System Installed
1 [X] Yes
2 [ ] No
A Other

50 IFR Equipped
1 [X] Yes
2 [ ] No
A Other

51 Icing Certification/Equipped *(Multiple entry)*
1 [X] Certified
2 [ ] Not Certified
3 [X] Equipped
4 [ ] Not Equipped
A Other

52 Engine Type
1 [ ] Reciprocating—carburetor
2 [ ] Reciprocating—fuel injected
3 [ ] Turbo prop
4 [ ] Turbo jet
5 [X] Turbo fan
6 [ ] Turbo shaft
A Other

If not Engine powered, go to block 59

53 Engine Manufacturer CFM Intl., Inc.

54 Engine Model and Series CFM-56-3-B1

55 Engine Rated Power
A ______ Horsepower
B 20000 Lbs. Thrust
C Other

56 Number of Engines 2
A Other

If 3 or more engines enter times in Supp. C

Engine Time (Hours)	A Total Time	B Time Since Inspection	C Time Since Major Overhaul	D Other
57 Engine No. 1	81	81		Ø6
58 Engine No. 2	81	81		Ø6

59 Type Maintenance Program
1 [ ] Annual
2 [ ] Manufacturer's Inspection Program
3 [ ] Other approved inspection program (AAIP)
4 [X] Continuous airworthiness
A Other

60 Type of Last Inspection
1 [ ] Annual
2 [ ] 100 hour
3 [ ] AAIP
4 [X] Continuous airworthiness
A Other

61 Date Last Inspection Performed *(Nos. for M, D, Y)* 5/2Ø/88
A Other

62 Time Since Inspection 1Ø Hours
A Other

63 Airframe Total Time 81 Hours
A Other

64 Source of Maintenance Information
1 [ ] Tach
2 [ ] Flight
3 [ ] Hobbs
4 [X] Logbooks Records
5 [ ] Estimate
6 [ ] Pilot/Operator Report
A Other

65 Hazardous Materials on Aircraft
1 [X] No
A *(Type)* ______
B Other

66 Hazardous Material Spill/Factor
1 [ ] Yes
2 [X] No
A Other

Emergency Locator Transmitter (ELT)	1 Yes	2 No	A Other
67 Installed	X		
68 Required		X	
69 Operated		X	
70 Aided in location of accident site		X	

Owner/Operator Information

71 Registered Aircraft Owner
Name Polaris Aircraft Leasing Corp.

72 Address Four Embarcadero Center
San Francisco, CA 94111

73 Operator of Aircraft 1 [ ] Same as registered owner
A Name: TACA Intl. Airlines, S.A.
B dba
C Other

74 Address 1 [ ] Same as registered owner
A P.O. Box 20047
Kenner, LA 70141
B Other

75 Operator Certificate No. 2Ø5
A Other

76 Operator Designator Code TAIF

NTSB Form 6120.4 (Rev. 1-84)

National Transportation Safety Board
FACTUAL REPORT AVIATION

NTSB Accident/Incident Number: FTW88IA1Ø9

Owner/Operator Information (continued)

77 Operator Status of This Aircraft
1 [ ] Owner
2 [X] Lessee
3 [ ] Renter
4 [ ] Borrower
5 [ ] Unauthorized
A Other

78 Pilot Status of This Aircraft
1 [ ] Owner
2 [ ] Lessee
3 [ ] Renter
4 [ ] Borrower
5 [ ] Unauthorized
6 [X] Employee
A Other

Type of Certificate(s) Held

79 None [ ] *(Go to block 83)*

80 Air Carrier Operating Certificate *(Check all applicable)*
1 [ ] Flag carrier/domestic (121)
2 [ ] Supplemental
3 [ ] All cargo (418)
4 [ ] Large helicopter (127)
5 [ ] Commuter air carrier
6 [ ] On-demand air taxi

81 Operating Certificate
[X] Other operator of large aircraft

82 Operator Certificate
1 [ ] Rotorcraft—external load operator (133)
2 [ ] Agricultural aircraft (137)

Regulation Flight Conducted Under

83 Regulation Flight Conducted Under
1 [ ] 14 CFR 91 *(only)*
2 [ ] 14 CFR 91D
3 [ ] 14 CFR 103
4 [ ] 14 CFR 105
5 [ ] 14 CFR 121
6 [ ] 14 CFR 125
7 [ ] 14 CFR 127
8 [ ] 14 CFR 133
9 [ ] 14 CFR 135
10 [ ] 14 CFR 137
11 [X] 14 CFR 129 *(Foreign flag)*
A Specify

Type of Flight Operation Conducted

*(Complete 84a, b, c **ONLY** if flight was a revenue operation conducted under 121, 125, 127, 129, 135)*

84a
1 [X] Scheduled
2 [ ] Non-scheduled

84b
1 [ ] Domestic
2 [X] International

84c
1 [ ] Passenger
2 [ ] Cargo
3 [X] Passenger/cargo
4 [ ] Mail contract ONLY

*(Complete 86 **ONLY** if 84a, b, c is not applicable)*

86
1 [ ] Personal
2 [ ] Business
3 [ ] Instructional *(Including air carrier training)*
4 [ ] Executive/corporate
5 [ ] Aerial application
6 [ ] Aerial observation
7 [ ] Other work use
8 [ ] Public use
9 [ ] Ferry
10 [ ] Positioning
A Specify ______

First Pilot Information

87 Name *(Last, First, Initial)*: DARDANO, CARLOS
A Other

88 Pilot Certificate No. [redacted]
A Other

89 Street Address [redacted]
A Other

90 City: KENNER
A Other

91 State: LA

92 Date of Birth *(Nos. for M, D, Y)* [redacted]
Other

93 Age: 29 Yrs.
A Other

94 Sex
1 [X] Male
2 [ ] Female

95 Seat Occupied
1 [X] Left
2 [ ] Right
3 [ ] Center
4 [ ] Front
5 [ ] Rear
A Other

96 Principal Profession
1 [X] Pilot—civilian
2 [ ] Pilot—military
3 [ ] Other—military
4 [ ] Aircraft mechanic
5 [ ] Business
6 [ ] Lawyer
7 [ ] Doctor/dentist
8 [ ] Police
9 [ ] Student
10 [ ] Clergy
11 [ ] Teacher
12 [ ] Engineer
13 [ ] Farmer/rancher
14 [ ] Retired
A Other

97 Certificate(s) *(Multiple entry)*
1 [ ] Student
2 [ ] Private
3 [ ] Commercial
4 [X] Airline Transport
5 [ ] Flight Instructor
6 [ ] Flight Engineer
7 [ ] Military
8 [ ] None
9 [X] Foreign
A Other

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First Pilot Information *(continued)* *(Multiple entry - blocks 98-102)*

98 Ratings—Airplane
1 [ ] None
2 [X] Single engine land
3 [X] Multiengine land
4 [ ] Single engine sea
5 [ ] Multiengine sea

99 Rotorcraft/Glider/LTA
1 [X] None
2 [ ] Helicopter
3 [ ] Gyroplane
4 [ ] Airship
5 [ ] Free balloon
6 [ ] Glider

100 Instrument Rating
1 [ ] None
2 [X] Airplane
3 [ ] Helicopter

101 Instructor Rating(s)
1 [X] None
2 [ ] Airplane SE
3 [ ] Airplane ME
4 [ ] Helicopter
5 [ ] Gyroplane
6 [ ] Glider
7 [ ] Instrument plane
8 [ ] Instrument helicopter

102 Ground Instructor
1 [X] None
2 [ ] Basic
3 [ ] Advanced
4 [ ] Instrument

103 Type Rating Endorsement This Aircraft
1 [X] Yes
2 [ ] No *(Go to block 105)*
A Other

104 Months Since Check/Endorsement This Aircraft
1 Months
A Other

105 Biennial Flight Review *(Or equivalent)*
1 [X] Yes
2 [ ] No
A Other

106 Months Since Last BFR
1 Months
A Other

107 BFR *(or equivalent)* **Aircraft Make/Model**
A Make BOEING
B Model 737-3ØØ
C Other

108 Medical Certificate
1 [ ] None
2 [X] Class 1
3 [ ] Class 2
4 [ ] Class 3
A Other

109 Medical Certificate Validity
1 [ ] Valid medical—no waivers/limitations
2 [X] Valid medical—with waivers/limitations
3 [ ] Non valid medical for this flight
4 [ ] Expired
5 [ ] No medical certificate
A Other

110 Date of Last Medical *(Nos. for M, D, Y)*
3/1/88
A Other

111 Medical limitation
1 [X] None
2 [ ] Vision
A Specify
B Other

112 Medical wavier
1 [ ] None
2 [X] Vision
3 [ ] Hearing
A Specify Prothesis
B Other

113 Statement of Demonstrated Ability
1 [X] Yes
2 [ ] No
A Other

114 Correcting Lenses *(Multiple entry)*
1 [X] Not required
2 [ ] Required to be in possession
3 [ ] Required, not in possession
4 [ ] Required to be worn
5 [ ] Required, not worn
6 [ ] Worn at time of accident
A Other

115 Source of Pilot Flight Time *(Multiple entry)*
1 [ ] Pilot log
2 [ ] Company
3 [ ] FAA
4 [X] Pilot/Operator Report
5 [ ] Investigator's Estimate
6 [ ] Relative
7 [ ] Other Person
A Other

Flight Time	A All A/C	B This Make & Model	C Airplane Single Engine	D Airplane Multiengine	E Night	F Instrument Actual	G Instrument Simulated	H Rotorcraft	I Glider	J Lighter Than Air	K Other
125 Total Time	1341Ø	4,011	7ØØØ	641Ø	15ØØ	75Ø	24Ø	11Ø	Ø	Ø	
126 Pilot In Command (PIC)	1Ø9ØØ	1,343	7ØØØ	2557	1ØØØ	5ØØ	12Ø	1ØØ	Ø	Ø	
127 Instructor	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	
128 This Make/Model											11
129 Last 90 Days	24Ø	24Ø	Ø	24Ø	1ØØ	25	8	Ø	Ø	Ø	
130 Last 30 Days	85	85	Ø	85	2Ø	6		Ø	Ø	Ø	11
131 Last 24 Hours	6	6	Ø	6	Ø	1		Ø	Ø	Ø	11

132 Landings—Last 90 Days All Aircraft
___ Day
A Other 11

133 Landings—Last 90 Days All Aircraft
___ Night
A Other ØG

134 Landings—Last 90 Days This Make/Model
___ Day
A Other 11

135 Landings—Last 90 Days This Make/Model
___ Night
A Other Ø6

136 Seatbelt Available
1 [X] Yes
2 [ ] No
A Other

137 Seatbelt Used
1 [X] Yes
2 [ ] No
A Other

138 Shoulder Harness Available
1 [X] Yes
2 [ ] No
A Other

139 Shoulder Harness Used
1 [X] Yes
2 [ ] No
A Other

140 Autopsy Performed *(This pilot)*
1 [ ] Yes
2 [X] No
A Other

141 Toxicology Performed *(This pilot)*
1 [ ] Yes
2 [X] No
A Other

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FACTUAL REPORT
AVIATION

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Pilot Information (continued)

142 Person at Controls
1 [X] Pilot in command
2 [ ] Second pilot
3 [ ] Both pilots
4 [ ] Non-pilot
5 [ ] No one
A Other

143 Simulated Instrument Flight
1 [ ] Yes
2 [X] No
A Other

144 Vision Restricting Device Used
1 [ ] Yes
2 [X] No
A Other

145 Second Pilot
1 [X] Yes *(Complete second pilot supplement)*
2 [ ] No

Flight Itinerary Information

155 Last Departure Point *(Multiple entry)*
1 [ ] Same as accident/incident location or
A Airport identifier BZE
B City/Place Belize City
C State OF
D Other

156 Time of Departure
A Time 1Ø55
B Time Zone CDT
C Other

157 Destination *(Multiple entry)*
1 [X] Same as accident/incident location or
2 [ ] Local flight
A Airport Identifier MSY
B City/Place
C State
D Other

158 Flight Plan Filed *(Multiple entry)*
1 [ ] None
2 [ ] Visual Flight Rules (VFR)
3 [X] Instrument Flight Rules (IFR)
4 [ ] VFR/IFR
5 [ ] Company (VFR)
6 [ ] Military (VFR)
A Other

159 Type of Clearance
1 [ ] None
2 [ ] VFR
3 [ ] Special VFR
4 [X] IFR
5 [ ] Special IFR
6 [ ] VFR on top
7 [ ] Cruise
8 [ ] Traffic Advisory
9 [ ] VFR Flight Following
A Other

160 Airspace
1 [ ] Uncontrolled
2 [ ] Controlled
3 [ ] Airport traffic area
4 [ ] Control zone
5 [ ] Airport advisory area
6 [ ] Positive control area
7 [ ] Terminal control area
8 [ ] Stage II TRSA
9 [X] Stage III TRSA
10 [ ] Prohibited area
11 [ ] Restricted area
12 [ ] Military Operating Area (MOA)
13 [ ] Student Jet Training Area
14 [ ] Demo Area
15 [ ] Warning area
16 [ ] FAR 93 (Special air traffic areas)
A Other

161 Control Area
1 [X] None
2 [ ] Victor airway
3 [ ] Jet airway
4 [ ] Control airway
5 [ ] Colored airway
A Other

162 Route
1 [ ] None
2 [ ] Standard instrument departure
3 [ ] Standard terminal arrival
4 [ ] RNAV/OMEGA/LCRAN/INS
5 [X] Direct
6 [ ] Profile Descent
7 [ ] VR route (military)
8 [ ] IR route (military)
9 [ ] SR route (military)
10 [ ] Refueling route (military)
A Other

163 Last Two Way Communications Established
1 [ ] None
2 [X] Yes
A Facility Identifier MSY TRACON
B Other

Aircraft Loading Information

164 Fuel on Board at Takeoff *(Multiple entry)*
1 [X] Estimated
2 [ ] Verified
A 24,ØØØ Gallons or
B ________ Pounds
C Other

165 Fuel Types *(Multiple entry)*
1 [ ] 80/87
2 [ ] 100 low lead
3 [ ] 100/130
4 [ ] 115/145
5 [ ] Kerosene
6 [ ] JP 3, 4, 5, 6
7 [X] Jet A
8 [ ] Jet B
9 [ ] Mixture
10 [ ] Automotive
11 [ ] Anti-ice additive added *(If known)*
A Other

166 Aircraft Weight at Takeoff *(Multiple entry)*
1 [X] At or below max cert. gross takeoff weight
2 [ ] Above max certified gross takeoff weight
3 [X] Estimated
4 [ ] Verified
A Other

167 Aircraft CG at Takeoff *(Multiple entry)*
1 [X] Within limits
2 [ ] Exceeded fwd limit
3 [ ] Exceeded aft limit
4 [ ] Exceeded lateral limit
5 [X] Estimated
6 [ ] Verified
A Other

168 Aircraft Weight at Accident *(Multiple entry)*
1 [ ] Same as takeoff
2 [X] At or below max cert. gross takeoff weight
3 [ ] Above max certified gross takeoff weight
4 [X] Estimated
5 [ ] Verified
A Other

169 Aircraft CG at Accident *(Multiple entry)*
1 [ ] Same as takeoff
2 [X] Within limits
3 [ ] Exceeded fwd limit
4 [ ] Exceeded aft limit
5 [ ] Exceeded lateral limit
6 [X] Estimated
7 [ ] Verified
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

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Aircraft Loading Information *(continued)*

170 Load Description *(Multiple entry)*

1 [ ] None
2 [X] Passengers
3 [X] Cargo
4 [ ] Towing glider
5 [ ] Towing banner
6 [ ] Other external
7 [ ] Parachutists
8 [ ] Water
9 [ ] Chemical
10 [ ] Livestock
11 [ ] Illegal cargo
A Other

Weather Information

180 Source of Weather Briefing *(Multiple entry)*

1 [ ] No record of briefing *(Go to block 183)*
2 [ ] National Weather Service (NWS)
3 [ ] Flight Service Station
4 [ ] PATWAS (Pilot Automated Tel. WX Answering Svc)
5 [ ] VRS (Voice Response System)
6 [X] Company
7 [ ] Commercial weather service
8 [ ] TV/radio weather
9 [ ] Military
A Other

181 Method of Briefing *(Multiple entry)*

1 [ ] In person
2 [X] Teletype
3 [ ] Telephone
4 [ ] Aircraft radio
5 [ ] TV/radio
A Other

182 Completeness of Weather briefing

1 [ ] Weather not pertinent
2 [ ] Full
3 [X] Partial—limited by pilot
4 [X] Partial—limited by briefer/forecaster
A Other

183 Investigator's Source of Weather Information

1 [ ] Pilot *(Go to block 185)*
2 [ ] Witness *(Go to block 185)*
3 [X] Weather observation facility

184 Weather Observation Facility

A Identifier NEW
B Time of observation 1253 zone CDT
C Elevation 9 feet MSL
D Distance from accident site 5 NM
E Direction from accident site 300 °magnetic

185 Basic Weather Conditions at Accident Site

1 [X] Visual Meteorological Conditions (VMC)
2 [ ] Instrument Meteorological Conditions (IMC)
A Other

186 Conditions of Light

1 [ ] Dawn
2 [X] Daylight
3 [ ] Night (Dark)
4 [ ] Night (Bright)
5 [ ] Dusk
A Other

187 Sky/Lowest/Cloud Condition

1 [ ] Clear
2 [ ] Scattered
3 [ ] Thin broken
4 [ ] Thin overcast
5 [ ] Partial obscuration
A ______ Feet AGL
B Other Ø6

188 Lowest Ceiling

1 [ ] None
2 [X] Broken
3 [ ] Overcast
4 [ ] Obscured
A 45ØØ Feet AGL
B Other

189 Visibility *(decimals)*

A 8 SM
B RVR ______ Feet
C RVV ______ SM
D Other

190 Temperature

77 °F
A Other

191 Dew Point

71 °F
A Other

192 Wind (From)

1 [ ] Variable
A 17Ø ° Magnetic
B Other

193 Wind Speed

1 [ ] Calm
2 [ ] Light and Variable
A 1Ø Kts.
B Other

194 Gusts

1 [X] None
A ______ Kts.
B Other

195 Altimeter Setting

29.88 " Hg
A Other

196 Density Altitude

______ Feet
A Other Ø6

197 Restrictions to Visibility

1 [X] None
2 [ ] Haze (H)
3 [ ] Dust (D)
4 [ ] Smoke (K)
5 [ ] Fog (F)
6 [ ] Ice fog (IF)
7 [ ] Ground fog (GF)
8 [ ] Blowing spray (BY)
9 [ ] Blowing dust (BD)
10 [ ] Blowing snow (BS)
11 [ ] Blowing sand (BN)
A Other

198 Type of Precipitation

1 [ ] None *(Go to block 200)*
2 [X] Rain (R)
3 [ ] Snow (S)
4 [ ] Hail (A)
5 [X] Rain showers (RW)
6 [ ] Freezing rain (ZR)
7 [ ] Snow shower (SW)
8 [ ] Drizzle (L)
9 [ ] Ice pellets (IP)
10 [ ] Snow pellets (SP)
11 [ ] Snow grains (SG)
12 [ ] Freezing drizzle (ZL)
13 [ ] Ice crystals (IC)
14 [ ] Ice pellet shower (IPW)
A Other

199 Intensity of Precipitation

1 [ ] Light
2 [X] Moderate
3 [ ] Heavy
A Other

National Transportation Safety Board
FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

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Accident Information

200 Aircraft Damage
1 [ ] None
2 [X] Minor
3 [ ] Substantial
4 [ ] Destroyed

201 Aircraft Fire
1 [X] None
2 [ ] In-flight
3 [ ] On ground
A Other

202 Explosion
1 [X] None
2 [ ] In-flight
3 [ ] On ground
A Other

203 Damage to Property
1 [X] None
2 [ ] Residence
3 [ ] Residential area
4 [ ] Commercial bldg.
5 [ ] Vehicle(s)
6 [ ] Airport facility
7 [ ] Trees
8 [ ] Crops
9 [ ] Fence
10 [ ] Wires/poles
11 [ ] Other property

204 Injury Index *(Most critical injury)*
1 [X] None 2 [ ] Minor 3 [ ] Serious 4 [ ] Fatal

Injury Summary *(Enter only one digit per block)*	A Fatal	B Serious	C Minor	D None	E Total
205 First Pilot				1	1
206 Co-pilot				1	1
207 Dual Student					
208 Check Pilot				1	1
209 Flight Engineer					
210 Cabin Attendants				4	4
211 Other Crew					
212 Passengers				38	38
213 TOTAL ABOARD				45	45
214 Other Aircraft					
215 Other Ground					
216 GRAND TOTAL				45	45

217 Classification
1 [ ] U.S. Registered Aircraft on U.S. Soil, Territories and Possessions, or International Waters
2 [ ] U.S. Registered Aircraft on Foreign Soil
3 [X] U.S. Registered Aircraft operated by a Foreign Operator
4 [ ] Foreign Registered Aircraft on U.S. Soil, Territories or Possessions
5 [ ] Military Aircraft
6 [ ] Aircraft not Registered

Part Failure/Incorrect Part

220 Part Failure/Malfunction *(Multiple entry)*
1 [ ] None
2 [X] Part/component #1
3 [X] Part/component #2
4 [ ] Part/component #3
A Other ____________

221 Incorrect Part *(Multiple entry)*
1 [X] None
2 [ ] Part/component #1
3 [ ] Part/component #2
4 [ ] Part/component #3
A Other ____________

	A Part/Component #1	B Part/Component #2	C Part/Component #3
222 Part Name	ENGINE	ENGINE	
223 ATA Code			
224 Manufacturer	CFM INTL.	CFM INTL	
225 Mfg. Part #	CFM56-3-B1	CFM56-3-B1	
226 Mfg. Model #	"	"	
227 Serial #	721971	721973	
228 Part Condition	FLAME OUT	FLAMEOUT	
229 Total Time	81	81	
230 TSO	N/A	N/A	
231 TSI	81	81	
232 Cycles Total	6Ø	60	
233 Cycles Since Overhaul	N/A	N/A	
234 Cycles Since Inspection	6Ø	6Ø	
235 Service Difficulty Report or Malfunction/Defect Report Submitted	1 [X] Yes 2 [ ] No	1 [X] Yes 2 [ ] No	1 [ ] Yes 2 [ ] No
236 Bogus Part	1 [ ] Yes 2 [X] No	1 [ ] Yes 2 [X] No	1 [ ] Yes 2 [ ] No

Supplement E – Second Pilot Information

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW88IA109

Supplement E — Second Pilot Information

1 Second Pilot Responsibilities

1 ☒ Copilot 2 ☐ Dual student 3 ☐ Safety pilot 4 ☐ Check pilot 5 ☐ None (Pilot-Rated Passenger) A Other

2 Name *(Last, First, Initial)*: LOPEZ, DIONISIO
A Other

3 Pilot Certificate No.: [redacted]
A Other

4 Street Address: [redacted]
A Other

5 City: KENNER
A Other

6 State: LA

7 Date of Birth *(Nos. for M, D, Y)*: [redacted]
A Other

8 Age: 44
A Other

9 Sex
1 ☒ Male
2 ☐ Female

10 Seat Occupied *(Multiple entry)*
1 ☐ Left
2 ☒ Right
3 ☐ Center
4 ☐ Front
5 ☐ Rear
A Other

11 Principal Profession
1 ☒ Pilot-civilian
2 ☐ Pilot-military
3 ☐ Other-military
4 ☐ Aircraft mechanic
5 ☐ Business
6 ☐ Lawyer
7 ☐ Doctor/dentist
8 ☐ Police
9 ☐ Student
10 ☐ Clergy
11 ☐ Teacher
12 ☐ Engineer
13 ☐ Farmer/Rancher
14 ☐ Retired
A Other

12 Certificate(s) *(Multiple entry)*
1 ☐ Student
2 ☐ Private
3 ☒ Commercial
4 ☐ Airline Transport
5 ☐ Flight Instructor
6 ☐ Flight Engineer
7 ☐ Military
8 ☐ None
9 ☒ Foreign
A Other

13 Ratings—Airplane *(Multiple entry)*
1 ☐ None
2 ☒ Single engine land
3 ☒ Multiengine land
4 ☐ Single engine sea
5 ☐ Multiengine sea

14 Rotorcraft/Glider/LTA *(Multiple entry)*
1 ☒ None
2 ☐ Helicopter
3 ☐ Gyroplane
4 ☐ Airship
5 ☐ Free balloon
6 ☐ Glider

15 Instrument Rating *(Multiple entry)*
1 ☐ None
2 ☒ Airplane
3 ☐ Helicopter

16 Instructor Rating(s) *(Multiple entry)*
1 ☒ None
2 ☐ Airplane SE
3 ☐ Airplane ME
4 ☐ Helicopter
5 ☐ Gyroplane
6 ☐ Glider
7 ☐ Instrument airplane
8 ☐ Instrument helicopter

17 Ground Instructor
1 ☐ Basic
2 ☐ Advanced
3 ☐ Instrument
4 ☒ None

18 Type Rating/Endorsement This Aircraft
1 ☒ Yes
2 ☐ No *(Go to block 20)*
A Other

19 Months Since Check/Endorsement This Aircraft: 2
A Other

20 Biennial Flight Review
1 ☒ Yes
2 ☐ No
A Other

21 Months Since Last BFR: 2 Months
A Other

22 BFR *(or equivalent)* **Aircraft Make/Model**
A Make BOEING
B Model 737-300
C Other

23 Medical Certificate
1 ☐ None
2 ☒ Class 1
3 ☐ Class 2
4 ☐ Class 3
A Other

24 Medical Certificate Validity
1 ☒ Valid medical-no waivers/limitations
2 ☐ Valid medical-with waivers/limitations
3 ☐ Non valid medical for this flight
4 ☐ Expired
5 ☐ No medical certificate
A Other

25 Date of Last Medical *(Nos. for D, M, Y)*: 3/15/88
A Other

26 Medical Limitation
1 ☒ None
2 ☐ Vision
A Specify
B Other

27 Medical Waiver
1 ☒ None
2 ☐ Vision
3 ☐ Hearing
A Specify
B Other

28 Statement of Demonstrated Ability
1 ☐ Yes
2 ☒ No
A Other

29 Correcting Lenses *(Multiple entry)*
1 ☒ Not required
2 ☐ Required to be in possession
3 ☐ Required, not in possession
4 ☐ Required to be worn
5 ☐ Required, not worn
6 ☐ Worn at time of accident
A Other

33 Source of Pilot Time
1 ☐ Pilot Log
2 ☐ Company
3 ☐ FAA
4 ☒ Pilot/Operator Report
5 ☐ Investigator's Estimate
6 ☐ Relative
7 ☐ Other Person
A Other

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

FTW88IA1Ø9

Supplement E — Second Pilot Information (continued)

Flight Time	A All A/C	B This Make & Model	C Airplane Single Engine	D Airplane Multi Engine	E Night	F Instrument Actual	G Instrument Simulated	H Rotorcraft	I Glider	J Lighter Than Air	K Other Code
35 Total Time	125ØØ	933	1Ø,ØØØ	2,5ØØ	1,ØØØ	5ØØ	18Ø	Ø	Ø	Ø	
36 Pilot in Command (PIC)	11833	Ø	1ØØØØ	1833	2ØØ	1ØØ	9Ø	Ø	Ø	Ø	
37 Instructor	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	
38 This Make/Model											11
39 Last 90 Days	18Ø	18Ø	Ø	18Ø	3Ø	15	8	Ø	Ø	Ø	
40 Last 30 Days	6Ø	6Ø	Ø	6Ø	1Ø	5	Ø	Ø	Ø	Ø	
41 Last 24 Hours	6	6	Ø	6	Ø	1	Ø	Ø	Ø	Ø	

42 Landings—Last 90 Days— All Aircraft—Day
A Other 11

43 Landings—Last 90 Days—All Aircraft—Night
A Other Ø6

44 Landings—Last 90 Days—This Make/Model—Day
A Other 11

45 Landings—Last 90 Days—This Make/Model—Night
A Other Ø6

46 Seatbelt Available
1 ☒ Yes
2 ☐ No
A Other

47 Seatbelt Used
1 ☒ Yes
2 ☐ No
A Other

48 Shoulder Harness Available
1 ☒ Yes
2 ☐ No
A Other

49 Shoulder Harness Used
1 ☒ Yes
2 ☐ No
A Other

50 Autopsy Performed — *(This Pilot)*
1 ☐ Yes
2 ☒ No
A Other

51 Toxicology Performed — *(This Pilot)*
1 ☐ Yes
2 ☒ No
A Other

Supplement F – Pilot/Second Pilot Training and Proficiency

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 8 I A 1 Ø 9

Supplement F—Pilot/Second Pilot Training and Proficiency

Pilot In Command Information 1 ☒ *If pertinent certificate or rating obtained more than 2 years previous to accident, mark "X" here and proceed to block 10.*

2 Certificate and/or Rating For Which Data Elements 3-9 Pertain. *(Multiple entry)*

1 ☐ Student 4 ☐ ATP 7 ☐ Single engine 10 ☐ Rotorcraft 13 ☐ Type rating
2 ☐ Private 5 ☐ Instructor 8 ☐ Multiengine 11 ☐ Glider A Other
3 ☐ Commercial 6 ☐ Instrument 9 ☐ Seaplane 12 ☐ Lighter Than Air (LTA)

3 Total Flight Hours When Certificate Rating Obtained

A Other

4 Source of Flight Training

1 ☐ 14 CFR 61 3 ☐ Military
2 ☐ 14 CFR 141 A Other

5 Recommending Flight Instructor Certificate #

A Other

6 Recommending Flight Instructor Status

1 ☐ Part-time
2 ☐ Full-time A Other

7 Flight Examiner *(Multiple entry)*

1 ☐ FAA employee 3 ☐ Company employee
2 ☐ FAA designee A Other

8 Flight Examiner #

A Other

9 Flight School Certificate #

A Other

Recency of Experience *(Complete only items related to accident.)*

	A Weeks Since Last	B Other	C FLT Hours Since Last	D Other	E Done on FLT Check 1 Yes	2 No	F Other	G Done on BFR 1 Yes	2 No	H Other
10 Tailwheel Landing										
11 Crosswind Takeoff/Landing										
12 Short field Takeoff/Landing										
13 Go-Around										
14 Actual/Simulated Instrument										
15 Instrument Approach-Precision										
16 Instrument Approach-Nonprecision										
17 Unusual Attitude Practice										
18 Stall Practice										
19 Spin										
20 Sim/Act Engine Out in Multiengine										
21 Simulated Forced Landing		12		12		X	12		X	12
22 180 Degree Accuracy Landing										
23 Autorotation										
24 Mountain flying										

25 Prior Experience in Geographical Area Last Year

1 ☒ Yes
2 ☐ No
A Other

26 Prior Experience at Airport/Airstrip Last Year

1 ☒ Yes
2 ☐ No
A Other

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

F T W 8 8 I A 1 Ø 9

Supplement F—Pilot/Second Pilot Training and Proficiency (continued)

Second Pilot Information 1 ☒ *If pertinent certificate or rating obtained more than 2 years previous to accident, mark "X" here and proceed to block 39.*

31 Certificate and/or Rating For Which Data Elements 32-38 Pertain. *(Multiple entry)*
1 ☐ Student
2 ☐ Private
3 ☐ Commercial
4 ☐ ATP
5 ☐ Instructor
6 ☐ Instrument
7 ☐ Single engine
8 ☐ Multiengine
9 ☐ Seaplane
10 ☐ Rotorcraft
11 ☐ Glider
12 ☐ Lighter Than Air (LTA)
13 ☐ Type rating
A Other

32 Total Flight Hours When Certificate Rating Obtained
A Other

33 Source of Flight Training
1 ☐ 14 CFR 61
2 ☐ 14 CFR 141
3 ☐ Military
A Other

34 Recommending Flight Instructor Certificate #
A Other

36 Recommending Flight Instructor Status
1 ☐ Part-time
2 ☐ Full-time
A Other

36 Flight Examiner *(Multiple entry)*
1 ☐ FAA employee
2 ☐ FAA designee
3 ☐ Company employee
A Other

37 Flight Examiner #
A Other

38 Flight School Certificate #
A Other

Recency of Experience *(Complete only items related to accident.)*

	A Weeks Since Last	B Other	C FLT Hours Since Last	D Other	E Done on FLT Check 1 Yes	E 2 No	F Other	G Done on BFR 1 Yes	G 2 No	H Other
39 Tailwheel Landing										
40 Crosswind Takeoff/Landing										
41 Short field Takeoff/Landing										
42 Go-Around										
43 Actual/Simulated Instrument										
44 Instrument Approach-Precision										
45 Instrument Apprcach-Nonprecision										
46 Unusual Attitude Practice										
47 Stall Practice										
48 Spin										
49 Sim/Act Engine Out In Multiengine										
50 Simulated Forced Landing		12		12		X	12		X	12
51 180 Degree Accuracy Landing										
52 Autorotation										
53 Mountain flying										

54 Prior Experience In Geographical Area Last Year
1 ☒ Yes
2 ☐ No
A Other

55 Prior Experience at Airport/Airstrip Last Year
1 ☒ Yes
2 ☐ No
A Other

Supplement R - Meteorology

National Transportation Safety Board

FACTUAL REPORT AVIATION

FTW88IA109

Supplement R—Meteorology

Complete this supplement for any accident in which weather conditions were considered a factor **and** *an on-scene investigation was conducted.*

1 Turbulence Forecast
1 [X] Yes
2 [ ] No *(Go to block 5)*

2 Severity of Forecast Turbulence
1 [ ] Light
2 [ ] Moderate
3 [X] Severe
4 [ ] Extreme
A Other

3 Type of Forecast Turbulence
1 [ ] In clouds
2 [X] In thunderstorm
3 [ ] Clear air
4 [ ] Mountain wave
A Other

4 Icing Forecast
1 [ ] Yes
2 [X] No *(Go to block 8)*

5 Severity of Forecast Icing
1 [ ] Trace
2 [ ] Light
3 [ ] Moderate
4 [ ] Severe
A Other

6 Type of Forecast Icing
1 [ ] Rime
2 [ ] Clear
3 [ ] Mixed
A Other

7 Thunderstorm Forecast
1 [X] Yes
2 [ ] No *(Go to block 10)*

8 Level of Forecast Thunderstorm
1 [ ] Severe
2 [X] Not severe
A Other

9 In-flight Weather Service Available
1 [X] Yes
2 [ ] No
A Other

10 In-flight Weather Service Used
1 [ ] Yes
2 [X] No
A Other

11 Type of In-flight Weather Service Used *(Multiple entry)*
1 [ ] ATC
2 [ ] FSS
3 [ ] ATIS
4 [ ] TWEB
5 [ ] EFAS
6 [ ] Company weather
7 [ ] Contract weather
8 [ ] VOR
A Other

Weather Conditions At Accident Site

If weather information entered on Form 6120.4 is based upon pilot/witness only, enter meteorological information from closest/most pertinent weather observation facility. Otherwise proceed to block 25.

12 Weather Observation Facility *(Direct entry)*
A Identifier ____
B Time of observation ____ zone ____
C Elevation ____ feet MSL
D Distance from accident site ____ NM
E Direction from accident site ____ magnetic

13 Sky/Lowest Cloud Condition *(Multiple entry)*
1 [ ] Clear
2 [ ] Scattered
3 [ ] Thin broken
4 [ ] Thin overcast
5 [ ] Partial obscuration
A ____ Feet AGL
B Other

14 Lowest Ceiling *(Multiple entry)*
1 [ ] None
2 [ ] Broken
3 [ ] Overcast
4 [ ] Obscured
A ____ Feet AGL
B Other

15 Visibility *(decimals)*
A ____ SM
B RVR ____ Feet
C RVV ____ SM
D Other

16 Temperature
____ °F
A Other

17 Dew Point
____ °F
A Other

18 Wind Direction *(From)*
1 [ ] Variable
A ____ ° magnetic
B Other

19 Wind Speed *(Multiple entry)*
1 [ ] Calm
2 [ ] Light and Variable
A ____ Knots
B ____ *(Gusts)* Knots
C Other

20 Altimeter Setting
A ____ " Hg
B Other

21 Density Altitude
____ Feet
A Other

22 Type of Precipitation *(Multiple entry)*
1 [ ] None *(Go to block 25)*
2 [ ] Rain (R)
3 [ ] Snow (S)
4 [ ] Hail (A)
5 [ ] Rain showers (RW)
6 [ ] Freezing rain (ZR)
7 [ ] Snow shower (SW)
8 [ ] Drizzle (L)
9 [ ] Ice pellets (IP)
10 [ ] Snow pellets (SP)
11 [ ] Snow grains (SG)
12 [ ] Freezing drizzle (ZL)
13 [ ] Ice crystals (IC)
14 [ ] Ice pellet shower (IPW)
A Other

23 Intensity of Precipitation
1 [ ] Light
2 [ ] Moderate
3 [ ] Heavy
A Other

24 Restrictions to visibility *(Multiple entry)*
1 [ ] None
2 [ ] Haze (H)
3 [ ] Dust (D)
4 [ ] Smoke (K)
5 [ ] Fog (F)
6 [ ] Ice fog (IF)
7 [ ] Ground fog (GF)
8 [ ] Blowing spray (BY)
9 [ ] Blowing dust (BD)
10 [ ] Blowing snow (BS)
11 [ ] Blowing Sand (BN)
A Other

National Transportation Safety Board

FACTUAL REPORT
AVIATION

FTW88IA109

Supplement R—Meteorology (continued)

Turbulence/Icing/Thunderstorms/Other Significant Weather

25 Turbulence *(Multiple entry)*
1 ☐ None
2 ☒ In clouds
3 ☒ In thunderstorms
4 ☐ Clear air
5 ☐ Mountain wave
A Other

26 Severity of Turbulence
1 ☐ Light
2 ☒ Moderate
3 ☐ Severe
4 ☐ Extreme
A Other

27 Source of Turbulence Information
1 ☐ National Weather Service (NWS)
2 ☒ Weather analysis
A Pilot report *(Aircraft type ______)*
B Other

28 Type of Icing Conditions That Existed *(Multiple entry)*
1 ☒ None
2 ☐ Frost
3 ☐ Rime *(Glaze)*
4 ☐ Clear
5 ☐ Mixed
A Other

29 Severity of Icing Conditions
1 ☐ Trace
2 ☐ Light
3 ☐ Moderate
4 ☐ Severe
A Other Ø6

30 Source of Icing Condition Information
1 ☐ National Weather Service (NWS)
2 ☐ Weather analysis
A Pilot report *(Aircraft type ______)*
B Other Ø6

31 Thunderstorm Activity Observed
1 ☐ None
2 ☐ Level 1 *(Light)*
3 ☐ Level 2 *(Moderate)*
4 ☐ Level 3 *(Heavy)*
5 ☐ Level 4 *(Very heavy)*
6 ☒ Level 5 *(Intense)*
7 ☐ Level 6 *(Extreme)*
A Other

32 Source of Thunderstorm Information
1 ☒ NWS
2 ☐ Witness
3 ☒ Weather analysis
A Pilot report *(Aircraft type ______)*
B Other

33 Other Significant Weather *(Multiple entry)*
1 ☒ None
2 ☐ Tornado
3 ☐ Wind shear
4 ☐ Frontal system
5 ☐ Inversion
6 ☐ Water spout
7 ☐ Hurricane
8 ☐ Funnel cloud
9 ☐ Squall line
10 ☐ Updraft
11 ☐ Downdraft
12 ☐ Variable cloud base
13 ☐ Whirlwind/dust devil
14 ☐ Mountain wave
A Other

34 Pertinent Weather Message Issued *(Multiple entry)*
1 ☐ AIRMET
2 ☒ SIGMET
3 ☒ Center Weather Advisory (CWA)
4 ☒ Convective SIGMET
A Other

35 Pilot Aware of Significant Weather *(Multiple entry)*
1 ☐ Turbulence
2 ☐ Icing
3 ☒ Thunderstorm
4 ☐ Other significant weather
5 ☐ No
A Other

36 Pilot's Source of Information *(Multiple entry)*
1 ☒ Briefing
2 ☐ In-flight advisories (AIRMET, SIGMET, etc.)
3 ☐ ATC
4 ☒ Pilot observation
5 ☒ Weather radar
6 ☐ Storm scope
A Other

Supplement S – Aircraft Occupant and Injured Ground Personnel

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB Accident/Incident Number

FTW88IA1Ø9

Supplement S—Aircraft Occupant and Injured Ground Personnel

Other Occupants	B	C	D	E	F	G	H Degree of Injury			
A Name	Seat No.	Address (City & State)	Crew	Passenger	Non-Occupant	FAA	4 Fatal	3 Serious	2 Minor	1 None
1 UNKNOWN/ Not RECORDED		(38 souls)		X						X
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

Supplement T – Flight Data Recorder (FDR)/Cockpit Voice Recorder (CVR)

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB Accident/Incident Number

F T W 8 8 I A 1 Ø 9

Supplement T—Flight Data Recorder (FDR)/Cockpit Voice Recorder (CVR)

Flight Data Recorder

1 Flight Data Recorder (FDR) Installed

1 ☒ Yes-recovered
2 ☐ Yes-not recovered
3 ☐ No
A Other

2 Flight Recorder Manufacturer

Sundstrand

A Other

3 Flight Recorder—Model No.

UFDR 3955

A Other

4 Flight Data Recorder Condition

1 ☐ Destroyed-fire
2 ☐ Destroyed-impact
3 ☐ Damaged-fire
4 ☐ Damaged-impact
5 ☒ Undamaged
A Other

5 Flight Data Recorder Source of Damage *(Multiple entry)*

1 ☐ Fire
2 ☐ Impact
A Other Ø6

6 Recording Medium Condition *(Multiple entry)*

1 ☒ Not damaged by occurrence
2 ☐ Destroyed by impact
3 ☐ Destroyed by fire
4 ☐ Damaged by impact
5 ☐ Damaged by fire
6 ☐ Damaged by mishandling
A Other

7 Data Recovery Status

1 ☒ All parameters recovered
2 ☐ Partial loss—impact/fire damage
3 ☐ Partial loss—preoccurrence recorder malfunction
4 ☐ Partial loss due to mishandling
5 ☐ Complete loss— preoccurrence allied system malfunction
6 ☐ Complete loss— preoccurrence recorder malfunction
7 ☐ Complete loss due to mishandling
8 ☐ Foil medium expended prior to occurrence
9 ☐ Occurrence prior to oldest recorded data
10 ☐ No data recovered
A Other

Cockpit Voice Recorder

8 Cockpit Voice Recorder (CVR) Installed

1 ☒ Yes-recovered
2 ☐ Yes-not recovered
3 ☐ No
A Other

9 Cockpit Voice Recorder Manufacturer

Fairchild

A Other

10 Cockpit Voice Recorder Model No.

A-1ØØA

A Other

11 Cockpit Voice Recorder Condition

1 ☐ Destroyed-fire
2 ☐ Destroyed-impact
3 ☐ Damaged-fire
4 ☐ Damaged-impact
5 ☒ Undamaged
A Other

12 CVR Component Condition

1 ☐ Pinger operable
2 ☐ Pinger inoperable
A Other Ø6

13 Recording Medium Condition

1 ☐ Destroyed
2 ☐ Damaged
3 ☒ Undamaged
A Other

14 CAM Recording Quality

1 ☐ Excellent
2 ☒ Satisfactory
3 ☐ Unsatisfactory
4 ☐ Unreadable
A Other

15 RDO Quality of Recording

1 ☐ Excellent
2 ☒ Satisfactory
3 ☐ Unsatisfactory
4 ☐ Unreadable
A Other

16 Recording Medium Quality Loss Source

1 ☒ None
2 ☐ Fire
3 ☐ Mechanical
4 ☐ Electrical
5 ☐ Maintenance and engineering
A Other

17 CVR Quality Loss Source

1 ☒ None
2 ☐ Fire
3 ☐ Mechanical
4 ☐ Electrical
5 ☐ Maintenance and engineering
A Other

18 Additional Recording Media Received *(Multiple entry)*

1 ☐ CVR
2 ☒ Tower
3 ☒ Center
4 ☐ ATC
5 ☐ Personal recorder
6 ☐ TV recorder
7 ☐ Commercial radio
8 ☐ Commercial TV
9 ☐ Motion picture film
A Other

Pilot/Operator Aircraft Accident Report, NTSB Form 6120.1/2

FORM APPROVED FOR USE THROUGH 11/30/90 BY OMB NO. 3147-0001.

RECEIVED JUL 05 1988 NTSB - FTW

NATIONAL TRANSPORTATION SAFETY BOARD
PILOT/OPERATOR AIRCRAFT ACCIDENT REPORT
This Form To Be Used For Reporting Civil Aircraft Accidents Involving Commercial and General Aviation Aircraft

Location

Nearest City/Place, State, Zip Code	Date of Accident	Local Time (24 HOUR CLOCK)	Zone	Elevation At Accident Site
NASA MICHOUD Assembly Facility New Orleans, Louisiana 70189	MAY 24, 1988	12:55	CDT	____ Feet MSL / 0' Feet MSL

If The Accident Occurred On Approach, Takeoff Or Within 3 Miles Of An Airport, Complete The Following Information

Proximity To Airport:

1. ☐ On Airport
2. ☐ Within 1/4 Mile
3. ☐ Within 1/2 Mile
4. ☐ Within 3/4 Mile
5. ☐ Within 1 Mile
6. ☐ Within 2 Miles
7. ☐ Within 3 Miles
8. ☒ Beyond 3 Miles

Airport Name	Airport Ident	Runway/Landing Surface And Conditions
Offsite landing from New Orleans Int'l	NASA-MICHOUD	1. Direction: 270° 2. Length: 6000' 3. Width: 130' 4. Surface: Grass 5. Condition: DRY, FIRM

Phase Of Operation:

1. ☐ Standing
2. ☐ Taxi
3. ☐ Takeoff
4. ☐ Climb
5. ☐ Cruise
6. ☒ Descent
7. ☐ Approach
8. ☐ Landing
9. ☐ Hover/Maneuver
10. ☒ Altitude Of In-Flight Occurrence 16000 Feet MSL

Aircraft Information

Registration Mark	Aircraft Manufacturer	Aircraft Type/Model	Serial Number	Cert Max Gross WT
N-75356	BOEING	737-3TO	23838	135,500 lbs

Type Of Aircraft
1. ☒ Airplane
2. ☐ Helicopter
3. ☐ Glider
4. ☐ Balloon
5. ☐ Blimp/Dirigible
6. ☐ Ultralight
7. ☐ Gyroplane
8. Specify ______

Type Of Airworthiness Certificate
1. ☐ Normal
2. ☐ Utility
3. ☐ Acrobatic
4. ☒ Transport
5. ☐ Restricted
6. ☐ Limited
7. ☐ Experimental
8. Specify ______

Amateur Built
1. ☐ Yes
2. ☒ No

Landing Gear
1. ☐ Tricycle—Fixed
2. ☒ Tricycle—Retractable
3. ☐ Tailwheel—Fixed
4. ☐ Tailwheel—Retractable
5. ☐ Tailwheel—Retractable Mains
6. ☐ Amphibian
7. ☐ Skid
8. ☐ Ski/Wheel
9. Specify ______

No. Of Seats
Flight/Cabin Crew 4/6
Pax 136

Stall Warning System Installed
1. ☒ Yes
2. ☐ No

IFR Equipped
1. ☒ Yes
2. ☐ No

Engine Type
1. ☐ Reciprocating—Carburetor
2. ☐ Reciprocating—Fuel Injected
3. ☐ Turbo Prop
4. ☐ Turbo Jet
5. ☒ Turbo Fan
6. ☐ Turbo Shaft

Engine Manufacturer	Engine Model/Series	Engine Rated Power	Type Of Fire Extinguishing System Used
CFM INT'L, Inc.	CFM56-3-B1	1. ____ Horsepower 2. 20000 Lbs. Thrust	1. ☒ None 2. Specify ______

Engine(s)	Date of Mfg.	Mfg. Serial No.	Total Time	Time Since Inspection	Time Since Overhaul
Engine No. 1	10/22/87	721971	80:43 Hours	80:43 Hours	80:43 Hours
Engine No. 2	10/22/87	721973	80:43 Hours	80:43 Hours	80:43 Hours
Engine No. 3	–	–	– Hours	– Hours	– Hours
Engine No. 4	–	–	– Hours	– Hours	– Hours

Type Of Maintenance Program
1. ☐ Annual
2. ☐ Manufacturer's Inspection Program
3. ☐ Other Approved Inspection Program (AAIP)
4. ☒ Continuous Airworthiness
5. Specify ______

Type Of Last Inspection
1. ☐ Annual
2. ☐ 100 Hour
3. ☐ AAIP
4. ☒ Continuous Airworthiness

Date Last Inspection Performed 05/20/88 (M/D/Y)
Time Since Last Inspection 9:51 Hours
Airframe Total Time 80:43 Hours

Emergency Locator Transmitter (ELT)	ELT Manufacturer	Model/Series	Serial Number	Battery Date (DUE) (M/D/Y)
	DAYTON GRANGER	DOLPHIN EB-2BW	39092	05/07/89

Switch: 1. ☐ On 2. ☐ Off 3. ☒ Armed
Operated: 1. ☐ Yes 2. ☒ No
Aided In Accident Location: 1. ☐ Yes 2. ☒ No

Registered Aircraft Owner
POLARIS AIRCRAFT LEASING CORP.

Address Four Embarcadero Center
San Francisco, California 94111-4146

Operator Of Aircraft
1. ☐ Same As Registered Owner
2. Name TACA INT'L AIRLINES, S.A.
3. DBS:

Address
1. ☐ Same As Registered Owner U.S. Mailing Address:
2. P.O. Box 20047
Kenner, Louisiana 70141

NTSB Form 6120.1/2 (11/87) This form replaces NTSB Forms 6120.1 (Rev. 10/77) and 6120.2 (Rev. 10/77).

Owner/Operator Information (cont.)

Operator (Certificate Number)	Operator Designator (4 Letter Designator)
205	TACA

Purpose Of Flight And Type Of Operation

Regulation Flight Conductor Under
1. [ ] FAR 91 (only) 4. [ ] FAR 121 7. [ ] FAR 133
2. [ ] FAR 91D 5. [ ] FAR 125 8. [ ] FAR 135
3. [ ] FAR 103 6. [x] FAR 129 9. [ ] FAR 137

Purpose Of Flight
1. [ ] Personal 6. [ ] Aerial Observation
2. [ ] Business 7. [ ] Other Work Use
3. [ ] Instructional 8. [x] Public Use
4. [ ] Executive/Corporate 9. [ ] Ferry
5. [ ] Aerial Application 10. [ ] Positioning

Operator Authority
FAR 121: 1. [ ] Domestic 2. [ ] Flag 3. [ ] Supplemental
FAR 135: 4. [ ] On Demand 5. [ ] Commuter
FAR 133: 6. [ ] Rotorcraft External Load
FAR 125: 7. [ ] Large Aircraft
FAR 129: 8. [x] Foreign

FAR 121, 125, 127, 129, 135 Revenue Operations
1. [x] Scheduled
2. [ ] Non Scheduled
3. [ ] Domestic
4. [x] International
5. [x] Passenger
6. [ ] Cargo
7. Specify ______

Pilot Information

Pilot Name	Pilot Certificate No.	Address	Nationality
CARLOS DARDANO	[redacted]	[redacted] Kenner, La. 70141	SALVADOREAN

Certificate(s)
1. [ ] Student 2. [ ] Private 3. [ ] Commercial 4. [x] Airline Transport 5. [ ] Flight Instructor 6. [ ] Flight Engineer 7. [ ] Military 8. [x] Foreign 9. [ ] None 10. Specify ______

Rating(s)
1. [ ] None 2. [x] Single Engine Land 3. [ ] Single Engine Sea 4. [x] Multiengine Land 5. [ ] Multiengine Sea 6. [ ] Helicopter 7. [ ] Glider 8. [ ] Free Balloon 9. [ ] Airship 10. [ ] Gyroplane

Instrument Rating(s)
1. [ ] None 2. [x] Airplane 3. [ ] Helicopter

Instructor Rating(s)
1. [x] None 2. [ ] Airplane S.E. 3. [ ] Airplane M.E. 4. [ ] Helicopter 5. [ ] Glider 6. [ ] Instrument Airplane 7. [ ] Instrument Helicopter 8. [ ] Ground Instructor 9. Specify ______

Type Ratings/Student Endorsements
U.S. REGISTERED B-737 LEASED TO TACA

Date Of Biennial Flight Review Or Equivalent (M/D/Y)
4/12/88:737-200/300Diff
11/19/88:737-200

BFR Aircraft (Simulator)
1. Make BOEING
2. Model 737-200/-300

Medical Certificate
1. [ ] None 2. [x] Class 1 3. [ ] Class 2 4. [ ] Class 3

Date Of Last Medical (M/D/Y) 3/01/88

Limitations NONE

Waivers PROTHESIS OF LEFT EYE

Date Of Birth (M/D/Y) [redacted]

Degree Of Injury
1. [x] None 2. [ ] Minor 3. [ ] Serious 4. [ ] Fatal

Seat Occupied
1. [x] Left 2. [ ] Right 3. [ ] Center 4. [ ] Front 5. [ ] Rear

Person At Controls At Time Of Accident
1. [x] Pilot In Command 2. [ ] Second Pilot 3. [ ] Both Pilots 4. [ ] Non-Pilot 5. [ ] No One

Seat Belt Available
1. [x] Yes 2. [ ] No

Seat Belt Used
1. [x] Yes 2. [ ] No

Shoulder Harness Available
1. [x] Yes 2. [ ] No

Shoulder Harness Used
1. [x] Yes 2. [ ] No

Source Of Pilot Flight Time Information
1. [ ] Pilot Logbook 2. [x] Operators Estimate 3. [ ] FAA Records 4. [x] Company 5. Specify ______

Flight Time	All A/C	This Make & Model	Airplane Single Engine	Airplane Multiengine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	13410	4,011	7000	6410	1500	750	240	110		
Pilot In Command (PIC)	10900	1,343	7000	2557	1000	500	120	100		
Instructor										
This Make/Model										
Last 90 Days	240	240		240	100	25	8			
Last 30 Days	85	85		85	20	6				
Last 24 Hours	6	6		6		1				

Second Pilot Information

Second Pilot Responsibilities At The Time Of Accident
1. [x] Co-Pilot 2. [ ] Dual Student 3. [ ] Safety Pilot 4. [ ] Check Pilot 5. [ ] None (Pilot-Rated Passenger)

Pilot Name	Pilot Certificate No.	Address	Nationality
DIONISIO LOPEZ	[redacted]	[redacted] Kenner, La. 70141	SALVADOREAN

Certificate(s)
1. [ ] Student 2. [ ] Private 3. [x] Commercial 4. [ ] Airline Transport 5. [ ] Flight Instructor 6. [ ] Flight Engineer 7. [ ] Military 8. [x] Foreign 9. None ______ 10. Specify ______

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Rating(s)		Instrument Rating(s)	Instructor Rating(s)	
1. [ ] None	6. [ ] Helicopter	1. [ ] None	1. [x] None	6. [ ] Instrument Airplane
2. [x] Single Engine Land	7. [ ] Glider	2. [x] Airplane	2. [ ] Airplane S.E.	7. [ ] Instrument Helicopter
3. [ ] Single Engine Sea	8. [ ] Free Balloon	3. [ ] Helicopter	3. [ ] Airplane M.E.	8. [ ] Ground Instructor
4. [x] Multiengine Land	9. [ ] Airship		4. [ ] Helicopter	9. Specify
5. [ ] Multiengine Sea	10. [ ] Gyroplane		5. [ ] Glider	

Type Ratings/Student Endorsements
EL SALVADOR: CO-PILOT BAC 1-11
CO-PILOT B-737

Date Of Biennial Flight Review Or Equivalent (M/D/Y)
03/06/88

BFR Aircraft (Simulator)
1. Make BOEING
2. Model 737-200/-300

Medical Certificate
1. [ ] None 3. [ ] Class 2
2. [x] Class 1 4. [ ] Class 3

Date Of Last Medical (M/D/Y) 3/15/88

Limitations NONE

Waivers NONE

Date Of Birth [redacted]

Degree Of Injury
1. [x] None 3. [ ] Serious
2. [ ] Minor 4. [ ] Fatal

Seat Occupied
1. [ ] Left 3. [ ] Center 5. [ ] Rear
2. [x] Right 4. [ ] Front

Seat Belt Available
1. [x] Yes
2. [ ] No

Seat Belt Used
1. [x] Yes
2. [ ] No

Shoulder Harness Available
1. [x] Yes
2. [ ] No

Shoulder Harness Used
1. [x] Yes
2. [ ] No

Source Of Pilot Flight Time Information
1. [ ] Pilot Logbook 4. [x] Company
2. [x] Operators Estimate 5. Specify
3. [ ] FAA Records

Flight Time	All A/C	This Make & Model	Airplane Single Engine	Airplane Multiengine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time	12500	933	10,000	2500	1000	500	180			
Pilot In Command (PIC)	11833		10,000	1833	200	100	90			
Instructor										
This Make/Model										
Last 90 Days	180	180		180	30	15	8			
Last 30 Days	60	60		60	10	5				
Last 24 Hours	6	6		6		1				

Other Personnel

Name	Seat	Address (City & State)	Crew	Passenger Non-Revenue	Passenger Revenue	Non-Occupant	FAA	Degree Of Injury (Fatal Serious Minor None)
1. Soley, Arturo	Jump	San Salvador, El Sal.	x					NONE
2. Rosales, Mirna	C/A-FWD	San Salvador, El Sal.	x					NONE
3. Lovo, Ivette	C/A-AFT	San Salvador, El Sal.	x					NONE
4. Gutierrez, G.	C/A-FWD	San Salvador, El Sal.	x					NONE
5. Castillo, L.	C/A-AFT	San Salvador, El Sal.	x					NONE
6. 38 PAX		see PAX MANIFEST		6	32			NONE

Last Departure Point
1. Airport ID BZE
2. City/Place Belize City
3. State Belize

Time Of Departure
1. Time 10:55
2. Time Zone CDT

Destination
1. Airport ID MSY
2. City/Place New Orleans
3. State Louisiana

Flight Plan Filed
1. [ ] None 4. [ ] VFR/IFR
2. [ ] VFR 5. [ ] Company (VFR)
3. [x] IFR 6. [ ] Military (VFR)

If Weather Was Involved, State If Weather Briefing Was Obtained Or If Weather Reports Were Checked And How It Was Accomplished
Weather briefing given to crew by TACA dispatch office in San Salvador prior to departure and hard copies of all pertinent enroute, station, alternates and forecasts given to crew and on file with NTSB

Fuel On Board At Last Takeoff
_____ Gallons or 24000 Pounds

Fuel Type
1. [ ] 80/87 4. [ ] 115/145 7. Specify
2. [ ] 100 Low Lead 5. [x] Jet A
3. [ ] 100/130 6. [ ] Automotive

Other Services, If Any, Prior To Departure
NONE

Souce Of Weather Infomration (Pilot/Operator, Weather Observation)
PILOT

Light Condition
1. [ ] Dawn 3. [ ] Dusk 5. [ ] Dark Night
2. [x] Daylight 4. [ ] Bright Night

Visibility 5 Miles

Temp (°F) 80

Weather Information At The Accident Site (cont.)

Dew Point	Altimeter Setting	Sky/Lowest Cloud Condition
N/A (°F)	2990 "Hg	1. ☐ Clear 2. ☒ Scattered 2000 Feet AGL 3. ☐ Broken ____ Feet AGL 4. ☒ Overcast 5000 Feet AGL 5. ☐ Partial Obscuration 6. ☐ Obscured

Wind Information	Restriction To Visibility	Type Precipitation	Intensity Of Precipitation
1. Direction SW 2. Velocity 8-10 KTS 3. Gusts NO KTS	PRECIPITATION	RAIN/HAIL	1. ☐ Light 2. ☒ Moderate 3. ☐ Heavy 4. Specify ____

Turbulence (Multiple entry)
1. ☐ None 2. ☐ Light 3. ☐ Moderate 4. ☒ Severe 5. ☐ Extreme 6. ☐ Clear Air 7. ☐ In Clouds

Damage To Aircraft And Other Property

Degree Of Aircraft Damage
1. ☐ None 2. ☒ Minor 3. ☐ Substantial 4. ☐ Destroyed

Fire
1. ☐ Yes 2. ☒ No 3. ☐ In-Flight 4. ☐ On Ground

Description Of Damage To Aircraft And Other Property

1) HAIL DAMAGE TO RADOME (LOST PAINT)
2) HAIL DAMAGE TO HORIZONTAL STABILIZER (18 DENTS TO LH AND 21 DENTS TO RH BEYOND AERODYNAMIC LIMITS)
3) OVERTERMP DAMAGE TO NO.2 ENGINE

Mechanical Malfunction Failure

1. ☐ No
2. ☒ Yes List The Name Of The Part, Manufacturer, Part No., Serial No. And Describe The Failure

SIMULTANEOUS FLAMEOUT ON BOTH ENGINES

Total Time

On Part	At Overhaul
80:43 Hours	80:43 Hours

Collision Accident NO

If Collison Accident Occurred, Complete The Information For Other Aircraft

Registration mark	Aircraft Manufacturer	Aircraft Type/Model	Degree Of Aircraft Damage
			1. ☐ Destroyed 2. ☐ Substantial 3. ☐ Minor 4. ☐ None

Registered Aircraft Owner	Address

Pilot Name	Address	Pilot Certificate No.

Evacuation Of Aircraft

Assistance Received
1. ☐ Outside Person(s) 3. ☒ Slide 5. ☐ Ladder
2. ☐ Auxiliary Lighting 4. ☒ Rope 6. ☐ Specify ____

Method Of Exit (State Approximate Number Of Persons Using Each Of The Following)
1. Main Door 15 2. Auxiliary Door 29 3. Emergency Exit 1

Recommendation (How Could This Accident Have Been Prevented)

Operator/Owner Safety Recommendation (Optional Entry)

UNDER INVESTIGATION

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Additional Flight Crew Members

For Each Additional Flight Crew Member, Exclusive Of Cabin Attenents Complete The Following Information:

Name	FAA Certificate No.	Address	Title

Certificate(s)

1. ☐ Student
2. ☐ Private
3. ☐ Commercial
4. ☐ Airline Transport
5. ☐ Flight Instructor
6. ☐ Flight Engineer
7. ☐ Foreign
8. Specify ____________

Ratings/Endorsements	Total Flight Time	Flight Time This Accident

Name	FAA Certificate No.	Address	Title

Certificate(s)

1. ☐ Student
2. ☐ Private
3. ☐ Commercial
4. ☐ Airline Transport
5. ☐ Flight Instructor
6. ☐ Flight Engineer
7. ☐ Foreign
8. Specify ____________

Ratings/Endorsements	Total Flight Time	Flight Time This Accident

Name	FAA Certificate No.	Address	Title

Certificate(s)

1. ☐ Student
2. ☐ Private
3. ☐ Commercial
4. ☐ Airline Transport
5. ☐ Flight Instructor
6. ☐ Flight Engineer
7. ☐ Foreign
8. Specify ____________

Ratings/Endorsements	Total Flight Time	Flight Time This Aircraft

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Describe What Occurred In Chronological Order, The Circumstances Leading To The Accident And The Nature Of The Accident. Describe The Terrain And Include A Sketch Of Wreckage Distribution If Pertinent. Attach Extra Sheets If More Space Is Needed. State Point Of Departure, Time Of Departure, Intended Destination And Services Obtained.

SEE ATTACHMENT

Date Of This Report	Signature Of Pilot/Operator

Signature Of Person Filing Report Other Than Pilot/Operator

1. Signature [redacted]
2. Type Or Print Name DONALD P. SCOTT
3. Title TACA U. S. OPERATIONS MANAGER

NTSB Accident No.	Reviewed By NTSB Office Located At	Name Of Investigator	Date Report Received
FTW-88-M-A109	Ft. Worth, TX	[redacted] W.V. Wandel	JUN 1, 1988

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CAPT. CARLOS A DARDANO'S REPORT

Flight TA 110 originating in San Salvador with a stop in Belize, destination New Orleans.

We took off from Belize with 24,000 pounds of fuel and all papers in due order. Flight plan was to New Orleans and we maintained it at 35,000 feet of altitude.

Having started the descent to New Orleans, and being on IFR condi tions, with the fasten seat belts sign on, the igniters on continuous and the radar on weather mode, we received instructions from the controller to deviate about 5 degrees towards the right of our present course. We next turned on the anti-ice device since we did detect icing conditions. When we were flying at 280 knots, and under automatic conditions of flight and power, we started to correct our deviation towards New Orleans, as we have been already authorized. Suddently we found obstacles with weather conditions and descending from about 15,000 feet to 13,000 feet, we felt a strong sudden descent and we lost all electric power. We did not know what was happening but we tried to re-start the electricity and then we concluded that we had lost all power in both engines. I ordered Capt. Soley to try to re-start the engines and told Pilot Lopez to advise the approach controllers of what was occuring; in the meantime I was trying to control the aircraft. Without knowing exactly what direction we were going, we encountered heavy turbulance and hail, combined with another sudden descent and lightning and after two or three minutes and proceeding as per the check lists, we turned on the APU, which restored the electric system, as well as the hydraulic system. Capt. Soley continued trying to restart the engines according to the instructions of our procedure check list (QRMB). Being still on IFR, we advised our emergency to New Orleans Approach Control, requesting vectors to reach the closest airport to try to land in those conditions. In the meantime we had advised our Senior Flight Attendant to prepare the cabin for a possible emergency landing.

Having received instructions from the Approach Control as to what route to take, we asked for weather conditions in the airport we were approaching; at that moment we appeared to have restored one of the engines. We called Approach again and told them we needed vectors towards New Orleans and advised them that we have restored power in one of the engines; meanwhile, we continued trying to re-start engine #2, which appeared to be restored as well and we turned towards the directions indicated by Control. We realized then that we had no power in either of the engines which surprised us, since we had received positive indications from the parameters; however, when we applied power there was no response. We continued to obtain information on the closest airport at which we could land, but we concluded that we did not have enough altitude to cover the distance (about 5,000 feet) and land safely from our position. Having decided that an emergency landing would be necessary, we started looking for an appropriate place. We initially concluded that the best alternative was to land in the water.

We established a plan towards a chosen spot at about 3,000 feet altitude, which was appropriate since it was near a place where we could get immediate help but at the same time without endangering people who were not involved in our emergency. While at about 1,000 feet, we noticed a field covered with grass and which was solid and will facilitate our landing. We decided this will be a safe place to land. We put down the landing gear and proceeded with complete landing procedures.

Immediately after the aircraft came to a complete stop, we ordered immediate evacuation of passengers and we concluded our procedures.

Capt. Carlos Dardano.–

–. Vuelo TA.110 originado en San Salvador con escala en Belize. destino final MSY. Despegamos de Belize con 24.000 lbs. de combustible y todos los papeles en orden. El vuelo se dirigio hacia la ciudad de New Orleans, el cual se mantuvo a una altitud de 35.000 pies:–
Habiendo iniciado el descenso hacia la ciudad de N.O. y encontrandonos en condiciones. IFR. con la señal del cinturon de seguridad puesta, los ignitores de los motores en continuo y el radar encendido en weather mode recibimos instrucciones por el controlador de una ligera desviacion de 5° hacia la derecha de nuestro rumbo actual.
Luego encendimos los anti-hielos de motor al detectar condiciones de hielo. Encontrandose el avion volando a 280 nudos. y bajo condicion automaticas de vuelo y potencia, comenzamos a dirigirnos a corregir nuestra desviacion para dirigirnos hacia N.O, tal como habiamos sido autorizados.
Repetidamente encontrandonos impedimiento en las condiciones de tiempo y descendiendo atraves de unos 15,000 a 13000 pies, sentimos un bajon brusco y perdimos toda energia electrica.
Sin realizar lo que estaba pasando.
Comun; (Oralo) Comenzamos a tratar de restablecer esta perdida de electricidad hasta concluir que nos encontrabamos sin potencia alguna.

en los dos turbinas

Ordené al Capt. Soley que intentara encender los motores y al piloto López que avisara al control de aproximación lo que estaba sucediendo mientras yo me dedicaba a controlar la aeronave sin saber exactamente en que dirección nos dirigíamos, entramos en turbulencia y granizo mayor combinado con otro fuerte bajón y rayos por alrededor de dos o tres minutos y procediendo seguir las listas de chequeo, Encendimos el APU lo cual nos restauró el sistema eléctrico dándonos con esto sistema hidráulico también el capt Soley continuaba intentando el encendido de las turbinas de acuerdo a las indicaciones de nuestros procedimientos enmarcados en las listas de chequeo (ORMTS) Encontrándonos todavía en condiciones IFR. inmediatamente proseguimos a declarar nuestra emergencia con N.O. approach control solicitando vectores para dirigirnos al aeropuerto más cercano para tratar de aterrizar el avión en esas condiciones. mientras tanto ya habíamos comunicado a la jefe de vuelo para que preparara su cabina. por algún posible aterrizaje de emergencia

Sigue

habiendo dado el control de aproximación el rumbo a seguir preguntamos las condiciones de tiempo hacia el aeropuerto que nos dirigíamos en ese instante aparentemente avíamos logrado encender una de las turbinas llamamos a Aproach Control nuevamente y les pedimos vectores a Vuelo 0. y les informamos restaurado potencia en uno de los motores; mientras tanto continuamos tratando encenderle el motor # 2 el cual aparentó establecerse también y viramos hacia la dirección indicada por aproach control entonces realizamos que no teníamos potencia en los motores lo cual nos sorprendió porque habíamos recibido indicaciones positivas de los parametros y cuando se aplicó potencia esta no respondió.

Continuamos recibiendo información sobre el aeropuerto más cercano donde pudiéramos aterrizar pero concluimos que no teníamos suficiente altitud para cubrir la distancia (unos 5000 pies) y aterrizar en forma segura desde nuestra posición también decidido que sería necesario un aterrizaje de emergencia comenzamos a buscar un lugar apropiado, inicialmente concluciendonos que la mejor alternativa era acuatizar. Estando establecido en la trayectoria de planeo hacia el punto escogido y a unos 3000 pies de altura el cual era el más apropiado por estar cerca... 37

de lugares habitados para tener inmediata ayuda al concluir nuestra emergencia. Estando en esta trayectoria y a unos 1000 pies de altura nos percatamos de la cercanía de un terreno firme cubierto por grama. el cual podría facilitar nuestro aterrizaje Decidimos aterrizar en ese lugar por considerarlo seguro. procedimos a bajar el tren y configurar el avion para un aterrizaje completo.

Inmediatamente después de detener la nave por completo ordenamos evacuación de los pasajeros y concluyendo nuestros procedimientos a seguir.

[redacted]

FIRST OFFICER DIONISIO LOPEZ

On Flight 110 SAL-BZE-MSY, we had a technical problem with the aircraft more or less a half hour before arrival at New Orleans Airport. We began to descend from 35,000 feet approved by Houston Center, who transferred us to another frequency of Houston Center, and authorized a right hand deviation to continue with the descent direct to New Orleans, authorizing us to change frequency to New Orleans approach. Check list was passed adequately. Our Radar read yellow and green. We continued on to New Orleans. On those moments we began to feel a slight turbulence and requested that the flight attendants take their seats. The turbulance suddenly increased with ups and downs and almost immediately lost all electrical power on the aircraft. The Captain then noted that the power on both engines was lost.

On board the flight deck as an observer was Capt. Arturo Soley. Capt. Dardano flew the aircraft; Capt. Soley was ordered to start the APU and attempt to start both engines. I handled the radio and assisted Capt. Soley.

Capt. Soley selected igniter switches to the flight position. We started the APU and at this moment proceeded by the radio to declare an emergency to New Orleans Approach Control.

No. 1 Bus Bar was transferred to the APU generator and we proceeded to try to start both engines with APU source, according with the check list. Capt. Soley informed Capt. Dardano that #1 Engine was operating and proceeding to power the #1 Bus Bar with #1 Generator. I proceeded to notify New Orleans Approach Control that we had #1 Engine operating and we needed vectors to New Orleans. Approach Control told us to make a left turn which we executed while Capt. Soley and I proceeded by the check list to start the #2 Engine. When Capt. Dardano executed the left turn, he applied power in order to maintain the altitude requested by New Orleans Approach Control. The engines would not respond. I advised Control of both engines being out. Capt. Dardano continued to pilot the aircraft. The Senior Flight Attendant was informed to prepare the cabin for an emergency landing.

We concentrated on locating an adequate place to land, following the descent path chosen by Capt. Dardano I saw a dry flat grassy strip which looked good for a landing. I brought the strip to the attention of Capt. Dardano and he saw it and proceeded toward it. We lowered the landing gear, applied flaps and maneuvered accurately and proceeded to land the aircraft safely and smoothly.

The emergency evacuation was accomplished without injury. We completed the appropriate check list and left the aircraft.

Dionisio Lopez Baltram

Co-pilot

REPORTE DEL PRIMER OFICIAL
DIONISIO LÓPEZ BELTRÁN. -

EN El VUELO TA 110 SAL-BZE-MSY, TUVIMOS UN PROBLEMA TÉCNICO CON LA AERONAVE, MÁS Ó MENOS MEDIA hora ANTES DE llEGAR AL AEROPUERTO DE NUEVA ORLEANS.

COMENZAMOS A DESCENDER DE 35.000 PIES SIENDO APROVADOS POR EL HOUSTON CENTRO, QUIEN NOS TRANSFIRIÓ A OTRA FRECUENCIA DEL HOUSTON CENTRO, Y NOS AUTORIZÓ UNA DESVIACIÓN HACIA LA DERECHA PARA CONTINUAR CON EL DESCENSO DIRECTO A NUEVA ORLEAS, AUTORIZANDONOS A CAMBIAR FRECUENCIA A NUEVA ORLEAS APROCH. LA LISTA DE CHEQUEO FUÉ COMPLETADA ADECUADAMENTE. NUESTRO RADAR MOSTRABA AMARILLO Y VERDE. DECIDIMOS CONTINUAR HACIA NUEVA ORLEANS, EN ESOS MOMENTOS COMENZAMOS A SENTIR UNA LIGERA TURBULENCIA Y PEDIMOS A LOS SOBRECARGOS QUE TOMARAN SUS ASIENTOS. LA TURBULENCIA AUMENTÓ DE REPENTE, CON ALTOS Y BAJOS Y CASI INMEDIATAMENTE PERDIMOS TODA ENERGÍA ELÉCTRICA EN LA AERONAVE.

EL CAPITÁN ENTONCES NOTÓ QUE SE HABÍA PERDIDO POTENCIA EN AMBOS MOTORES.

A BORDO DE LA CABINA DE MANDO COMO OBSERVADOR SE ENCONTRABA EL CAPITÁN ARTURO SOLEY. EL CAPITÁN DARDANO VOLÓ EL AVIÓN MIENTRAS EL CAPITÁN SOLEY SE LE ORDENÓ ARRANCAR EL A.P.U. Y TRATAR DE ARRANCAR AMBAS MÁQUINAS. YO MANEJABA LA RADIO Y ASISTÍA AL CAPITÁN SOLEY. EL CAPITÁN SOLEY SELECCIONÓ LOS SWITCHES DE IGNICIÓN A LA POSICIÓN "FLIGT".
ARRANCAMOS EL A.P.U. Y EN ESE MOMENTO PROCEDÍ A DECLARAR LA EMERGENCIA AL CONTROL DE APROXIMACIÓN DE NEW ORLEANS POR LA RADIO.
EL BUS #1 FUÉ TRANSFERIDO AL GENERADOR DEL A.P.U. Y PROCEDIMOS A TRATAR DE ARRANCAR AMBAS MAQUINAS CON LA FUENTE DEL A.P.U. DE ACUERDO CON LA LISTA DE CHEQUEO.
EL CAPITÁN SOLEY LE INFORMÓ AL CAPITAN DARDANO QUE EL MOTOR #1 ESTABA OPERANDO Y PROCEDIÓ A ORGANIZAR LA BARRA #1 CON EL GENERADOR #1. YO PROCEDÍ A NOTIFICAR AL CONTROL DE APROXIMACIÓN DE NUEVA ORLEANS QUE TENÍAMOS EL MOTOR #1 OPERANDO Y QUE NECESITÁBAMOS VECTORES HACIA NUEVA ORLEANS.
CONTROL DE APROXIMACIÓN NOS DIJÓ QUE HICIERAMOS UN VIRAJE A LA IZQ. EL CUAL EJECUTAMOS, MIENTRAS

EL CAPITÁN SOCEY Y YO PROCEDÍAMOS CON LA LISTA DE CHEQUEO A ENCENDER EL MOTOR #2; CUANDO EL CAPITÁN DARDANO APLICÓ POTENCIA PARA VIRAR POR LA IZQ. Y MANTENER LA ALTURA REQUERIDA POR EL CONTROL DE APROXIMACIÓN LAS MÁQUINAS NO RESPONDIERON. YO NOTIFIQUÉ AL CONTROL QUE AMBAS MÁQUINAS ESTABAN APAGADAS; EL CAPITÁN DÁRDANO CONTINUÓ PILOTEANDO LA AERONAVE; LA JEFE DE SOBRECARGOS FUÉ INFORMADA QUE PREPARARAN LA CABINA PARA UN ATERRIZAGE DE EMERGENCIA.

NOS CONCENTRAMOS PARA LOCALIZAR UN LUGAR ADECUADO PARA ATERRIZAR. SIGUIENDO EL DESCENSO ESCOGIDO POR EL CAPITÁN DÁRDANO, VÍ UNA FAJA DE TIERRA ENGRAMADA QUE SE MIRABA BIEN PARA NUESTRAN INTENCIONES DE ATERRIZAGE, LO CUAL LO MANIFESTÉ AL CAPITAN. Y EL PROCEDIÓ HACIA ELLA. BAJAMOS EL TREN DE ATERRIZAGE, APLICAMOS FLAPS Y MANIOBRAMOS CON EXACTITUD. YO ELABORÉ LA LISTA DE CHEQUEO PARA EL ATERRIZAGE Y PROCEDIMOS A ATERRIZAR LA AERONAVE, SUAVE Y SEGURAMENTE.

LA EVACUACIÓN DE EMERGENCIA FUÉ
llEVADA ACABO SIN PERCANCE.
COMPLETAMOS LA LISTA DE CHEQUEO
APROPIADA Y EN EL TIEMPO PRUDEN-
CIAL ABANDONAMOS LA AERONAVE.

[redacted]

DIONISIO LÓPEZ B.

CAPT. ARTURO SOLEY'S REPORT

TACA 110/24 MAY 1988 - Leg BZE/MSY

I had been authorized by Capt. Dardano to remain in the cabin as an observer. During the descent and landing in New Orleans we suffered the simultaneous loss of both engines, and Capt. Dardano ordered me to be in charge of re-starting the engines.

1) I turned on both igniters on FLT. Then I turned on the APU, opened the fuel crossfeed valve.

2) No response in the parameters of the engines.

3) I put Bus Bar #1 on the generator of the APU.

4) I proceeded to start the engines with the APU as per the check list, with the help of Lopez.

5) I get starter cut-out and engine bus bar #1. I inform the Captain that we have restored power in #1.

6) I proceeded to start #2 with the same positive results.

7) I inform the Captain of the satisfactory start of engine #2; however, he informed me that there was no power.

8) The EGT went up and then the red light appeared in both indicators.

9) I proceeded to cut start levers. There was not enough time to attempt to restart again as the Captain informed me that we had no more time and should secure myself for an emergency landing.

10) We completed the landing safely.

REPORTE CAPT ARTURO SOLEY

TACA 110 24-MAYO-1988 PORCIÓN BZE/MSY

Habiendo sido autorizado por el capitán Dardano para permanecer en la cabina de mando, como observador, durante el descenso y aterrizaje en New Orleans, sufrimos la perdida de ambos motores simultaneamente, por lo que el capitan Dardano me ordeno tomar a mi cargo el encendido de los motores

1 - Pose ambos IGNITERS en F/T, acto seguido encendi el APU, abro el Fuel crossfeed valve
2 - No hubo respuesta en los parametros de los motores
3 - Coloco la barra #1 en el generador del APU
4 - Procedo a encender los motores con el APU de acuerdo a la lista de chequeo
5. obtengo STARTER CUT OUT y barra en el motor #1 informe al capitán que tenemos el motor #1 encendido
6 - Procedo al encendido del #2 con los mismos resultados positivos
7 - Informo al capitan del encendido satisfactorio del motor #2 sin embargo me informa que carece de potencia
8 - EGT sube con luz roja en ambos indicadores
9. Procedo a cortar start levers; no trato nuevamente por ser informado por el capitán, que no hay tiempo y que me asegure para un aterrizaje de emergencia
10 Completamos el aterrizaje en forma segura

CREW MEMBER NAME: MYRNA ROSALES 05-25-88

SENIOR IN CHARGE

Previous to Flight 110 of May 24, which started in El Saivador, we carried out a briefing with location of emergency equipment in the cabin, as well as designation of duties and position of each flight attendant.

Before take-off from Belize we carried out the demonstration of life vests, exits, seat belts, and emergency demonstration cards as in regular procedure or routine. We prepared the cabin for takeoff, instructed the passengers correctly as to use of seat belts, locations of emergency exits, etc.

During the flight we had the following incident:

> A few minutes before landing, when the Seat Belt sign was already on, given that we already had initiated the decent, we also received an order from the Captain to keep the seat belts fastened. We flew into turbulence in the area; following, we felt that the lights in the cabin went out and the emergency lights immediately came "ON" throughout the cabin. When the turbulence had calmed down, the Captain called me to tell me to prepare the cabin for an emergency landing, to which I proceeded, prepared the cabin, and instructed the passengers as to appropriate procedures, including the proper positions to take, location of exits and other steps to be followed by regulations. We then took our places. It is worth mentioning that everyone remained very calm and no one panicked.
>
> The landing was smooth. As soon as the airplane stopped completely, we checked exits and starte the evacuation in an orderly manner. All the passengers remained calm. The flight attendants after having checked the cabin abondoned the airplane. The passengers were safely kept together. We determined there were no injuries and were then transported to the NASA building. All doors and all slides functioned perfectly.

Myrna Rosales

Mayo 25/88

Sobrecargo: Myrna Rosales
Jefe de Vuelo

Previo al vuelo 110 del 24 de mayo, que origina en El Salvador, realizamos un briefing con localización de equipo de emergencia en cabina, así como la asignación de deberes y posiciones de cada tripulante.
Antes de despegar de Belize realizamos la demostración de chalecos, máscaras, salidas de emergencia, cinturones y tarjeta de indicaciones de emergencia como es de procedimiento regular ó rutina. Preparamos la cabina para el despegue, instruimos a los pasajeros sobre el uso correcto de los asientos de seguridad, ubicación de salidas de emergencia, etc.
Durante el vuelo se presentó el siguiente incidente: A pocos minutos antes de aterrizar, cuando ya la señal del cinturón se encontraba encendida, puesto que ya habíamos iniciado el descenso, recibiendo también orden del capitán de permanecer con cinturones asegurados, entramos en turbulencia en el area; seguido se sintió que las luces de la cabina se apagaron y las de emergencia se encendieron inmediatamente a lo largo de la cabina, cuando la turbulencia había calmado, el capitán me llamó para indicarme que preparara cabina para un aterrizaje de emergencia a lo cual pro-

cedí a la preparación de cabina e instruí a los pasajeros sobre los procedimientos apropiados a seguir incluyendo las posiciones apropiadas a tomar, ubicaciones de salida y otros; pasos a seguir por regulaciones. Luego tomamos nuestras posiciones, cabe mencionar que todos presentaron mucha calma y nadie tuvo pánico. El aterrizaje fué suave.

Tan pronto el avión paró por completo, chequeamos salidas y se inició la evacuación ordenadamente, todos los pasajeros mantuvieron la calma; la tripulación de cabina después de haber chequeado la cabina, abandonó la aeronave, se mantuvo a los pasajeros agrupados en forma segura.

Determinamos que no hubo heridos y fuimos trasladados al edificio de NASA.

Toda puerta y todo tobogan funcionó perfectamente.

CREW'S NAME: LUIS E. CASTILLO

FLIGHT REPORT

DATE: 24 May 88

FLIGHT NUMBER: 110

INTRODUCTION

As in every flight before starting our duties, we had our pre-briefing in which our "Senior Flight Attendant" (Mirna Rosales) assigned me position #3. (Forward demonstration).

In this position the crew memb er works in the Forward part of the airplane. My first duty is to check the emergency equipment of this part of the airplane, which was in perfect functional state and informed this to the Senior Flight Attendant. Following this I proceeded to do everything that is done in a normal flight.

PRE-EMERGENCY MOMENT (5 MINUTES)

In the leg BZE-MSY after having finished our Exclusive Service I started to prepare for landing when the captain informed us by the P.A. system to take our seats and secure ourselves since the seat belt sign had been on for approximately 5 minutes, and I had already checked that the passengers had their seat belts securely fastened. At that time we secured the forward galley, and secured ourselves in the jump seat.

Following this, rain started and turbulence began. Soon following this the lights went out, and the emergency light turned "ON". When the turbulence calmed down, Captain Dardano called Mirna and when she came out, she informed us to prepare the passenger cabin for an emergency landing.

EMERGENCY (5 MINUTES)

Immediately, we went out to the cabin to follow the planned emergency steps per our Emergency Procedures while Mirna by the P.A. system informed the passengers that:

We were going to have an emergency landing.

We instructed the passengers to remove all sharp objects.

We showed the passengers the emergency exits.

We checked that everyone had their seat belts secured, the seat back in the upright position and the tray table secured.

We showed the passengers the impact positions.

We collected all hand luggage loose in the cabin.

We took our positions.

When the "NO SMOKING" sign turned "ON", we started to shout to the passengers to take impact positions.

EVACUATION (30 SECONDS)

We landed. (At that time I did not know where.)

I felt the landing completely normal and when the airplane came to a complete stop, I proceeded to check my assigned door and opened; starting to direct the passengers to the exits and tell them how to jump.

The evacuation was really fast (30 seconds maximum), after which I checked the cabin to make sure no passengers were left behind, I took one megaphone (bin 1ABC) and jumped.

POST EVACUATION

With the megaphone I started to get the people together since they had wandered away.

When I had them together we started to ask the passengers if they have any cuts or blows and made sure there were no injured passengers. One lady that three days before had undergone surgery was laid down because she had pain in her stitches.

Luis E. Castillo

SOBRECARGO LUIS ENRIQUE CASTILLO

REPORTE DE VUELO

FECHA: 24-MAYO-88

VUELO: 110

INTRODUCCION

Como todo vuelo, antes de comenzar nuestras responsabilidades, tuvimos nuestro habitual "pre-briefing" en el cual nuestra Jefe de Vuelo (MIRNA ROSALES) me asigno la posicion 3 (Demostración Adelante). En esta posición el tripulante trabaja en la parte delantera del avión.

Mi primera obligación es revisar el equipo de emergencia de ésta parte del aeroplano, el cual estaba en perfecto estado e funcionamiento, informando de esto a la jefe de vuelo. Seguidamente procedi a hacer todo lo que en un vuelo normal se hace.

MOMENTO PRE-EMERGENCIA (5 minutos)

En el trayecto Belize-New Orleans despues de haber terminado nuestro Servicio Exclusivo comenze a prepararme para aterrizar cuando el capitan nos informo por el P.A. que tomaramos asiento y nos aseguraramos ya que la señal del cinturón tenia aprox. 5 minutos de encendida y yo ya habia chequeado que los pasajeros estuvieran con el cinturon debidamente asegurado. En ese momento aseguramos el galley delantero y nos aseguramos en el jump seat, a continuación comenzo a llover y a sentir una turbulencia, seguidamente se fueron las luces y se encendieron las de emergencia. Cuando se calmo la turbulencia el cap. Dardano llamo a Mirna y al salir me informo que prapararamos cabina de pasajeros para un aterrizaje de emergencia.

EMERGENCIA (5 minutos)

Inmediatamente salimos a la cabina a seguir los pasos de emergencia planificada establecidos en nuestros procedimientos de emergencia, mientras Mirna por medio del P.A. informaba a los pasajeros sobre que:

- Ibamos a tener un aterrizaje de emergencia
- Instruimos a los pasajeros a que se quitaran todos los objetos punzocortantes
- Señalamos la salida de emergencias a los pasajeros
- Chequeamos que todos los pasajeros estuvieran con el cinturon asegurado, el respaldo en posicion vertical y la mesa asegurada.
- les enseñamos a los pasajeros las pocisiones de impacto
- Recogimos todo el equipaje de mano suelto.

en la cabina
- Tomamos nuestras posiciones

Cuando se encendio el letrero de No Fumar comenzamos a gritarle a los pasajeros que tomaran sus pocisiones de impacto.

EVACUACION (30 segundos)

Aterrizamos (en ese instante no sabia adonde).

El aterrizaje lo senti completamente normal y al parar el avión completamente procedi a chequear mi puerta asignada y abri; comenzamos a dirigir a los pasajeros a las salidas y a decirles como saltar.

La evacuacion fue rapidisima (30 seg. maximo) despues cheque la cabina que no quedaran pasajeros tomé un megáfono (bin 1 ABC) y salte.

POST EVACUACION

Con el megafono comenze a reunir a la gente ya que habian tomado diferentes rumbos.

Al tenerlos reunidos comenzamos a preguntarles si tenian algun golpe o herida, constatando que no habia habido ningun golpeado salvo una señorita que la habian operado hacia tres diás que la acostamos porque le dolian las puntadas y se la llevo la ambulancia

F [redacted]

LUIS E. CASTILLO

SOBRECARGO

May 25, 1988

On Flight 110 a few minutes before landing in New Orleans we had the following incident:

> We were on our descent into New Orleans with the seatbelt sign on. Everything was stowed away in the compartments and the Captain asked us through the P.A. system to take our positions due to bad weather. We did as we were told and went through some turbulence while seated in our jumpseats. The internal lights went out and emergency lights came on. Internal lights returned after turbulence ended, and we heard the emergency signal coming from the front. My fellow-worker and I went to the front cabin and Senior informed us we'd be having an emergency landing and she started giving us instructions about informing passengers of the emergency exits, bracing position, emergency card, and all other steps concerning emergency landing and evacuation. When all passengers were prepared and hand baggage was stowed in compartments, we proceeded to take our positions and waited for the landing. As soon as the plane came to a complete stop, we proceeded to open rear doors, slides opened and we indicated the exits to the passengers. After all passengers evacuated safely and quickly, we left the plane. We had no problems with the evacuation.
>
> On ground, we gathered people together away from the plane and waited for transportation. Passengers didn't panic and followed our instructions during the whole operation. There were no injuries.

Ivette Lovo Castelar

May 25, 1988

On flight 110, a few minutes before landing in New Orleans, we had the following incident.

We were on our descent into New Orleans with the seatbelt sign on, everything was stowed away in the compartments and the Captain asked us through the P.A. system to take our positions due to bad weather. We did as we were told and went through some turbulence while seated in our jumpseats. Internal lights went out and emergency lights came on. Internal lights returned. After turbulence ended, we heard the emergency signal coming from the front. My fellow-worker and I went to the front cabin and senior informed us we'd be having an emergency landing and she started giving us instructions about informing passengers of the emergency exits, bracing position, emergency card, and all other steps concerning with emergency landing and evacuation. When all passengers were prepared and hand baggage was stowed in compartments, we proceeded to take our positions and waited for the landing. As soon as the plane came to a complete stop, we proceeded to open rear doors, slides opened and we indicated the exits to the passengers. After all passengers evacuated safely and quickly, we left the plane. We had no problems with the evacuation.

On ground we gathered people together away from plane and waited for transportation. Passengers didn't panic and followed our instructions during the whole operation. There were no injuries.

~~Ivette Lovo Castelar~~

Ivette Lovo Castelar

STEWARDESS: GLORIA GUTIERREZ

DATE: MAY 25, 1988

During TACA Flight 110, SAL-BZE-MSY, we had an incident just a few minutes before our anticipated landing at the New Orleans Airport.

Having already the seat belt sign on in the passenger cabin to prepare for landing, the Captain announced by the P.A. system "Crew take your seats". (I wish to mention that my location was in the AFT cabin with my other companion.) We took our seats. In a few moments turbulence began and we lost the aircraft interior lights which were immediately replaced with the emergency lights. The cabin lights came back on. When the aircraft left turbulence we heard an emergency ring and we went to the Senior Flight Attendant and she informed us that we were to prepare for an emergency landing. We prepared the cabin according to standard procedures and took positions for landing.

When the airplane came to a complete stop we checked the doors, opened them and slides inflated properly. We evacuated the passengers from the plane. We gathered all passengers, checked if anyone had a problem, no one presented any - no panic. The ambulance and transport arrived immediately, and we were carried out of the place.

Gloria Gutierrez
Sobrecargo

Sobrecargo: Gloria Gutiérrez
Fecha: 25 MAYO 1988

En vuelo 110 TACA, SAL/BZE/NEW ORLEANS, tuvimos un incidente a pocos minutos de nuestro anticipado aterrizaje en el Aeropuerto de New Orleans.
Teniendo ya encendido señal de cinturones en cabina para prepararnos para aterrizaje, anunció el Capitán por P.A: tripulación tomar sus asientos (quiero decir que mi posición era en la parte de atrás con mi otra compañera) lo hicimos y en unos momentos comenzó una fuerte turbulencia y perdimos luces internas del avión, las cuales fueron inmediatamente reemplazadas por las luces de emergencia; luego regresaron las luces de cabina. Cuando el avión dejó la turbulencia oimos timbrazos de emergencia y fuimos donde Jefe de Vuelo y nos informó que deberíamos prepararnos para un aterrizaje de Emergencia, preparamos cabina de acuerdo a procedimientos estandar y tomamos posiciones para el aterrizaje.
Cuando el avión se detuvo por completo, chequeamos puertas, las abrimos, se inflaron toboganes correctamente.

Evacuamos pasajeros del avión. Luego:
Reunimos todos los pasajeros, chequeamos si había alguién con problemas, nadie presentó nada, no hubo pánico, inmediatamente llegó ambolancia, transporte y todos fuimos transportados del lugar. -

[redacted]

Gloria Gutiérrez

Operations Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D.C. 20594

RECEIVED
SEP 19 1988
NTSB - FTW

August 8, 1988

Operations Group Chairman's Factual Report of Investigation

FTW-88-M-A109

A. Incident

Location	:	New Orleans, Louisiana
Date	:	May 24, 1988; 1256 C.D.T. 1/
Operator	:	TACA International Airlines, S.A.
Aircraft	:	Boeing 737-300, Flight 110, N75356

B. Group

Jeffrey L. Gorney	Group Chairman, NTSB
Donald P. Scott	TACA
Nathaniel D. Potter	FAA
Andrew P. Mihalchik	CFM International
Terence H. Kriha	Boeing

C. Summary

On May 24, 1988, at approximately 1256 Central Daylight Time, TACA International Airlines, S.A. Flight 110, N75356, a Boeing 737-300, made a forced landing on an unimproved, grass field in New Orleans, Louisiana following the loss of power from both engines at approximately 16,500 feet. There were 38 passengers, 4 flight attendants, 2 flight crewmembers, and a company B-737 captain occupying the cockpit jumpseat. Of the 45 persons aboard, there were no injuries.

The airplane was on a scheduled international air carrier flight from Belize City, Belize to New Orleans, Louisiana. At the time of the engine power loss, instrument meteorological conditions prevailed, which included heavy rain, hail, and turbulence. Visual meteorological conditions with rain were encountered as the airplane descended through 5,000 feet until touchdown.

D. History of Flight

On May 24, 1988, TACA International Airlines, S.A. Flight 110 was a regularly scheduled, passenger flight from San Salvador, El Salvador to the New Orleans International Airport, Kenner, Louisiana, with an intermediate stop at Belize City,

1/ All times are local, unless stated otherwise.

Belize. The flight was operating under 14 CFR Part 129 as a foreign air carrier operating a United States registered aircraft.

Flight 110 departed Belize City at approximately 1050 C.D.T. Cruise altitude for the flight was FL 350. The flight proceeded uneventfully until its arrival in the New Orleans terminal area.

The crew observed thunderstorm activity on their weather radar as they descended from FL 350. The captain stated that the range was set to 50nm and the antenna tilt at 0 to 2° down. New Orleans approach control issued vectors to deviate around the weather, which was appearing on the flightcrew's weather radar as green and yellow returns, with isolated red cells to the left and right of the flight path. The captain stated that just prior to entering cirrus clouds at approximately 30,000 feet, he selected the engine ignition to continuous (right ignition selected), and activated engine anti-ice on both engines. A slight ice buildup on the windscreen was subsequently observed.

The autoflight system was configured for LNAV and VNAV, with the autopilot and autothrottles engaged prior to deviations. When approach control issued vectors and a descent to 4,000 feet, the captain (who flew the airplane throughout the entire incident) selected level change descent, autothrottles on, and heading select. He selected 280 KIAS on the mode control panel (MCP) and on the FMC descent page. He continued the use of speedbrakes, which had been continuously deployed throughout the descent. The captain believed that the throttles were at idle. He stated that he "let the throttles (autothrottles) do their job."

The flightcrew stated they entered a region of moderate to heavy hail for a few seconds, followed immediately by heavy rain, turbulence and lightning. The captain stated, however, that he had flown through heavier rain in his career with no difficulty. He said they experienced these severe conditions for about 15-30 seconds, and then lost both AC electrical buses simultaneously. He then advanced the throttles 2-3 times with no engine power response whatsoever.

The captain then instructed the first officer to handle the radios and to assist the observer captain in starting the engines. The captain flew the airplane on the standby horizon and altimeter, and turned to the northeast on the standby magnetic compass in an attempt to avoid the thunderstorm activity and find VFR weather conditions.

The observer (a company B-737 captain and instructor pilot) selected the start switches to FLT, started the APU, and selected the APU generator to the No.1 electrical bus. He then opened the fuel crossfeed and left the start levers in the idle detent. He

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waited an undetermined period of time with no success for the engines to windmill restart before performing the Engine Failure and Shutdown checklists.

The observer captain then performed the Starter Assist Inflight Start checklist. He stated that American Airlines' training had showed the class how to utilize APU bleed air to perform a starter-assist restart. He stated that he turned off both packs, opened the APU bleed valve, and left the isolation switch in AUTO and both engine bleed switches ON. Duct pressure was "vertical" on the gage for both left and right duct pressures. He initally attempted a restart on the No.1 engine. He selected GRD ignition, and then moved that start lever to idle at 26% N_2. He stated that starter cutout occurred, and the EGT rose to some peak value and then decreased. The first officer stated that he noted the duct pressure recovery, and the start switch returned to OFF.

Subsequently, the No.1 blue GEN OFF BUS light illuminated, and the observer captain stated that he selected the No.1 engine generator on the No.1 electrical bus, tripping off the APU generator. He then started the No.2 engine in the same manner, but was unsure if he selected the No.2 engine generator, or put the APU generator, on the No.2 electrical bus. By this time, the airplane had descended below the clouds at 5,000 feet m.s.l., and was in VFR conditions with light rain and 5 miles visibility over Lake Borgne. The first officer reported to approach control that they had "both engines back." The captain stated that he advanced both throttles to maintain an ATC-assigned altitude of 5,000 feet. As he did so, he felt no response from either engine and observed both EGT limit lights illuminate. The flightcrew then shut down both engines, and the observer captain abandoned all restart attempts.

By this time, the airplane had descended to 2,000-3,000 feet m.s.l., and the flightcrew resigned themselves to an unpowered landing. The captain initially thought of executing a 360° turn over Lake Borgne and ditching there, but then sighted the waterway adjacent to the NASA Michoud levee. He prepared to ditch there, but the first officer saw a grassy area north of the levee, and informed the captain who then agreed to land there. Flaps had been extended, and the airspeed was approximately 140 KIAS. The landing gear was extended and full flaps were selected approaching the grass landing strip. The captain used speedbrakes and side-slipped the airplane to touch down as soon as possible after crossing the wall at the east end of the grass strip. He said he touched down gently and used speedbrakes. He braked gently to keep the gear from digging into the sod, and brought the airplane to a stop.

There were no injuries to any persons aboard. The airplane sustained minor damage from hail on the radome and leading edges of the tail surfaces. The incident occurred during the hours of daylight, at latitude/longitude coordinates of $30^{o}02'$N-$90^{o}54'$W.

Flightcrew Information

Captain Carlos Dardano

Captain Dardano, 28, is the holder of Airline Transport Pilot Certificate [redacted], with the following ratings:

Airplane Multiengine Land, B-737

Captain Dardano's airman certificate is a special purpose certificate issued by the FAA because TACA operates U.S. registered aircraft. Captain Dardano holds a valid FAA First Class Medical Certificate, with a waiver for a prothesis of the left eye, issued 3-10-88.

Captain Dardano was hired by TACA International Airlines, S.A. on 4-1-81, and was initially assigned as a Flight Engineer on the B-737-200. During 1983, he upgraded to First Officer on B-737-200 and BAC-1-11 aircraft. He upgraded to Captain on the B-737-200 on 9-10-86. Captain Dardano satisfactorily completed B-737 recurrent training on 5-27-87 at United Airlines. B-737-300 differences training was satisfactorily completed by Captain Dardano on 4-12-88 at American Airlines. This training consisted of 36 hours of ground school and 8 hours of flight simulator time. Captain Dardano's last proficiency check was completed on 11-19-87 in a B-737-200.

Captain Dardano's flight times, based on his pilot logbook and company records, indicate the following:

Total Flight Time (hrs)	13,410
B-737 (all models)	4,010
B-737-300	5.5
Pilot-in-Command (all models)	10,900
Multiengine Land	11,301
Single Engine Land	2,000
Helicopter	110
Night	1,500
Instrument	501

Captain Dardano had flown 240 hours, and 75 hours, in the last ninety, and thirty day periods, respectively, prior to the incident. He had been on duty 5 hours, 35 minutes on the day of the incident.

First Officer Dionisio Lopez

First Officer Lopez, 44, is the holder of Commerical Pilot Certificate [redacted], issued by the FAA, with the following ratings:

Airplane Multiengine and Single Engine Land

First Officer Lopez holds a valid FAA First Class Medical Certificate, with no limitations or waivers, which was issued on 3-15-88.

First Officer Lopez was hired by TACA International Airlines, S.A. on 4-1-86, and was initially assigned as a First Officer on the BAC-1-11. He was subsequently assigned as a First Officer on the B-737-200 on 10-1-86. His last proficiency check was in a B-737-200 on 3-6-88. His B-737 recurrent and B-737-300 differences training (identical to Captain Dardano's) were satisfactorily completed on 3-11-88.

First Officer Lopez's flight times, based upon his pilot logbook and company records, indicate the following:

Total Flight Time (hrs.)	12,500
B-737 (all models)	750
B-737-300	5.5
Pilot-in-Command (all models)	11,326
Multiengine Land	2,500
Single Engine Land	10,000
Night	500
Instrument	144

First officer Lopez had flown 240 hours, and 72 hours, in the last 90, and 30 days periods, respectively. He had been on duty 6 hours on the day of the incident.

Observer Captain Arturo Soley

Captain Soley, 35, was occupying the cockpit jumpseat during the incident. He was officially observing the performance of Captain Dardano. Captain Soley is the holder of Airline Transport Pilot Certificate [redacted], issued by the FAA, with the following ratings:

Airplane Multiengine Land, B-737

Captain Soley had a valid First Class Medical Certificate issued in San Salvador on 4-20-88. He was a company flight instructor for all B-737 aircraft.

Company Operations and FAA Surveillance

TACA International Airlines, S.A. was established as a scheduled air carrier in 1931, and has been in continuous operation since that date. TACA maintains a foreign air carrier certificate, and is authorized to conduct scheduled operations to and from the United States under 14 CFR Part 129.

The certificate holding office for TACA is FAA District Office SW-FSDO-62, 9191 Plank Road, Baton Rouge, Louisiana. FAA oversight of TACA has been assigned to this District Office since 1947.

TACA operates four (4) B-737 aircraft, consisting of two (2) Basic and one Advanced model -200's, and one B-737-300. These aircraft are all U.S. registered. TACA also operates a U.S. registered B-767-200 airplane, in addition to two (2) BAC-1-11-400 aircraft of Salvadorean registry. TACA has operated turbojet aircraft since 1966, and has not had an accident or incident since 1959.

FAA surveillance responsibility of Part 129 operators is limited to ramp checks only. All other surveillance is by request only from the carrier, and is accomplished if time and personnel are available. The Baton Rouge FAA District Office continuously visits, and works directly with, the New Orleans-based Director of Operations to review and approve MEL's, Operations Manual Bulletins, procedures, etc. A quarterly ramp inspection of TACA aircraft is accomplished in New Orleans.

It is the opinion of the POI that TACA's operation is equivalent to a 14 CFR Part 121 operation in all respects, despite being a 14 CFR Part 129 operator.

TACA Training Program

TACA's Pilot Training Program for the B-737-200/300 is contained in the Boeing 737 Flight Crew Training Manual, the latest version dated October 30, 1986.

Initial ground training is required of all newly-hired pilots, regardless of past experience. This training consists of four (4) parts:

(1) Company Indoctrination

(2) Ground school on the type of aircraft to be flown, including all systems, emergency procedures, the use of emergency equipment, evacuation, etc.

(3) Flight training, in either an FAA-approved simulator or the actual aircraft. If majority of training is in the simulator, airplane training is limited to 3 hours of flight in the aircraft, plus the checkride.

(4) Newly-hired pilots also receive a course, given at training centers such as United Airlines' Training Center in Denver, or American Airlines' Training Center in Irvine, California, on high altitude weather, turbojet characteristics, radar interpretation, and use of oxygen systems.

Flight simulator time for initial upgrade training of First Officers and Captains is the same as that recommended by Boeing, and consists of 8 simulator periods (32 hours), not including the checkride. All TACA captains receive recurrent training or proficiency checks twice per year. All other pilots receive recurrent training annually, and receive a proficiency check bi-annually. Recurrent training consists of 16 hours of ground school devoted to airplane systems, and a review of pertinent information concerning industry-wide operational difficulties. Also, two 4-hour simulator sessions are given during recurrent training.

TACA maintains its own training center at its base in San Salvador, El Salvador. This training facility has no simulator, but does have ground school classrooms where all pilots are required to spend a minimum of 8 hours of training a month. Topics covered include airplane systems, cockpit review, weather, performance, etc. A Spiritus AVT (audio-visual training) system is used for this training. Training films, such as "Windshear Avoidance" and other weather-related topics, are maintained here.

Engine Inoperative, Severe Weather Penetation Procedures, and Inflight Restart procedures are taught during initial, recurrent and upgrade training. B-737-300 differences training includes engine inoperative, severe weather penetration, and inflight restart procedures. Operations Manual Bulletin (OMB) 87-7 was not discussed.

TACA conforms with 14 CFR Part 121 regulations in areas related to route qualifications, pilot line checks, and pilot progress reports. In addition to a Chief Pilot, TACA has its own line check pilots and instructor pilots.

Airplane Information

Aircraft N75356 (S/N 23838), a Boeing 737-300, was delivered by Boeing to the Texas Air Corp. on 3-2-88. The aircraft was subsequently sold to the Polaris Aircraft Leasing Co., which in turn leased it to TACA International Airlines, S.A. on 5-3-88.

Two CFM56-3-B1 dual-spool, high bypass, turbofan engines rated at 20,000 pounds static takeoff thrust (sea level, standard day) were installed. Engine S/N 721-971 was installed in the Number 1 position (left side) and engine S/N 721-973 was installed in the Number 2 position (right side) at the time of delivery, as well as at the time of the incident. Both engines had P/N 9368M57P15 main engine fuel controls installed, and the 5th stage start bleed valve modification installed. The airplane was equipped with a Collins WRT-701X weather radar unit.

At the time of the incident, the estimated airplane gross weight was 94,000 pounds, with a c.g. location of 16.0% m.a.c. (allowable limits are 7.0-28.0% m.a.c.).

Pertinent Airplane Operating Procedures

Attached are copies of the published airplane operating procedures for:

Attachment I--Descent
Attachment II--Engine operation during severe precipitation (including Operations Manual Bulletin 87-8)
Attachment III--Engine Failure and Shutdown
Attachment IV--Inflight Engine Start
Attachment V--Operations Manual Bulletin 88-5
Attachment VI--Operations Manual Bulletin 88-6

The following information is intended to amplify the pertinent procedures and describe the associated airplane system operation.

Descent Procedure

See Attachment I.

Engine Operation During Severe Precipitation

Operations Manual Bulletin 87-8, issued on 10/28/87 to all B-737-300 operators, revises the engine operating procedures during severe precipitation to require "FLT" ignition and engine anti-ice "ON". Moving the ignition switch to the "FLT" position causes both engine ignition systems on each engine to be powered, regardless of the Igniter Selector Switch position. Positioning the engine anti-ice switch to the "ON" position in flight causes the engine control system to automatically schedule "high" idle instead of "low" idle when idle thrust is being maintained.

Subsequent to this incident, the Boeing Company issued Operations Manual Bulletin 88-5, effective June 8, 1988. The purpose of this bulletin was to advise all B-737-300 operators to maintain a minimum engine N_1 power setting of 45 percent, and to disengage the autothrottles if moderate to heavy precipitation is encountered during flight.

On 6-14-88, the FAA issued Airworthiness Directive (AD) T88-13-51 to all operators of Boeing Model 737-300 series airplanes equipped with CFM56-3 series engines. The AD was issued as a result of two recent dual engine flameout incidents on Boeing Model 737-300 airplanes while operating in severe thunderstorm activity. The AD revised the limitation section of the Airplane Flight Manual (AFM) by requiring operation with a minimum N_1 engine speed of 45 percent, engine ignition in the FLT position in moderate or heavy precipitation, autothrottle in the OFF position when flying in moderate to severe turbulence,

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cautionary note advising that flight in moderate to severe thunderstorm activity is to be avoided.

Engine Failure and Shutdown

There was not a dual engine loss/inflight start procedure in effect at the time of the subject incident. On 6-17-88, the Boeing Company issued Operations Manual Bulletin 88-6, "Loss of Both Engines," to all B-737-300 operators. The purpose of this bulletin is to provide flightcrews with a procedure to restore engine operation in the event thrust or thrust lever response is lost from both engines.

The following is a description of what effect each step of the Inflight Engine Start procedure has on airplane systems and/or the engine starting process.

1. -Complete the Engine Failure and Shutdown checklist before attempting restart.

   This ensures the thrust lever is returned to the idle position and fuel flow is shut off to the engine, clearing the engine of residual fuel and allowing a stall to clear if a stall exists.

2. -Check inflight start envelope

   Determine whether windmill or starter assist start is preferred. Starter assist should always be used if N_2 is below 15%.

Starter Assist Procedures

3. -Pack Switch (affected side) . . . "OFF"

   This ensures adequate starter supply air by preventing the air conditioning pack from consuming a portion of the available air supply. If either pack switch is selected "OFF" while the Isolation Valve Switch is in the "AUTO" position, the isolation valve will open to allow cross-bleeding for starting.

4. -Duct Pressure . . . Minimum 30 PSI

   Ensures adequate air supply is available for engine start.

5. -Ignition Select Switch . . . "BOTH"

   This causes both ignition systems on the engine to be powered when the starter is engaged and fuel flow is initiated to the engine.

6. -Start Switch . . . "GRD"

This causes the starter air valve to open and selects ignition system operation per the Ignition Select Switch position.

Note: The Start Switch is a four-position rotary switch. The four positions are labeled "GRD", "OFF", CONT", and FLT".

-"GRD" commands the starter air valve open and selects ignition system operation per the Ignition Select Switch position. When engaged, the start switch is latched in the "GRD" position against a spring force until starter cutout speed (46% N_2) is reached, at which time it returns automatically to the "OFF" position.

-"OFF" removes power from the engine's ignition systems.

-"CONT" selects ignition system operation per the Ignition Select Switch Position.

-"FLT" selects power to both ignition systems on the engine regardless of Ignition Select Switch position.

7. -Start Lever . . . IDLE

This opens the fuel shutoff valves and enables ignition as selected by the Start Switch/Ignition Select Switch.

Windmill Restart Procedure

1. -Start Switch . . . "FLT"
   See description above

2. Start Lever . . . "IDLE"
   See description above

[redacted]

Jeffrey L. Gorney
Air Safety Investigator

Attachments

Attachment I

Descent Procedure

DESCENT PROCEDURE

General

Plan the descent based on distance from the approach fix so that cruise altitude can be maintained as long as possible and still arrive at the fix at the required altitude. Distance to go and airplane altitude must be continuously compared to ensure that the airplane maintains the desired profile. Do not reduce cruise thrust until the desired descent speed is reached after starting down, and reduce thrust slowly to allow the pressurization system to compensate for changes in airflow.

Both pilots will connect shoulder harness prior to starting descent.

During descent from enroute flight altitude the pilot not flying will announce the standard callouts.

If landing lights are required in the terminal area, activate inboard landing lights and strobes passing 10,000 feet.

Turbulence

In case of severe air turbulence, a descent schedule of .70M/280/250 knots should be maintained through the turbulent area. When airplane gross weight is at or below maximum landing weight, the turbulent air descent speed may be slowed to 250 KIAS.

Use of Speed Brakes

The normal descent from cruise is in a clean configuration. Speedbrakes may be extended to increase the descent rate or to reduce speed. Actuate the Speed Brake Lever smoothly and slowly to the FLIGHT DETENT. Speedbrake usage between down detent and flight detent is not recommended. Do not use the full UP position in flight.

Auto Brake

Select desired autobrake level consistent with runway length, condition and desired stopping distance.

Anti-Ice

When engine or engine and wing anti-ice is used the fuel control automatically selects high idle as the minimum N1 RPM. This increases descent distance over low idle descent distance by approximately 2% for each 10,000 feet of altitude lost. If additional drag is required, use speedbrakes and/or landing gear.

Attachment II

Engine Operation During Severe Precipitation
(Including Operations Manual Bulletin 87-8)

8/14

ENGINE OPERATION DURING SEVERE PRECIPITATION

Avoidance of severe weather areas minimizes exposure to abnormally heavy precipitation and reduces the possibility of engine damage due to water-induced compressor stalls.

If extremely heavy precipitation is inadvertently encountered follow the turbulent air penetration procedure.

Do not make thrust changes in extremely heavy precipitation unless excessive airspeed variations occur. If thrust changes are necessary, move thrust levers very slowly. Rapid thrust lever movements during flight in extremely heavy precipitation may cause engine stall and damage. Avoid changing thrust lever direction until engines have stabilized at a selected setting.

ENGINE OPERATION DURING MODERATE TO SEVERE ICING CONDITIONS

At the relatively high thrust settings used during climb or cruise, the engine anti-icing system supplies adequate heat for protection against the accumulation of ice in the inlet lip. The engine control system is designed to automatically increase the idle thrust level to "High Idle" when engine anti-ice is selected to ensure adequate heat during low thrust operation.

The LOW IDLE light illuminates when either engine operates at less than "High Idle" RPM with engine anti-ice selected.

An increase in engine vibration, during conditions with or without engine anti-ice, may be due to fan blade/spinner icing. This ice can be dissipated by an application of higher thrust.

If fan blade/spinner icing is suspected of causing vibration, the following procedure may be used to eliminate the ice on <u>one</u> engine at a time.

<u>If the vibration occurs with engine anti-ice off:</u>

Ignition ....FLT

Thrust ....REDUCE TO IDLE

Engine Anti-Ice Switches ....ON

Monitor engine instruments (especially EGT) for abnormal indications.

<u>If the vibration occurs or persists with engine anti-ice activated:</u>

Ignition ....FLT

Thrust ....ADJUST

Slowly increase engine thrust while monitoring engine instruments (especially EGT) for abnormal indications. If vibration decreases, indicating ice removal, resume normal operation. If vibration does not decrease after engine acceleration, operate the engine at reduced thrust.

SEVERE TURBULENCE

The best airspeed and flight configuration to use in severe turbulence is that which affords ample protection from stall and high speed buffet, and which also preserves structural integrity. The recommended procedures for flight in severe turbulence are summarized as follows:

Structural

Flap extension in an area of known turbulence should be delayed as long as possible because the airplane can withstand higher gust loads in the clean configuration. Diversion to another airfield is the best policy if severe turbulence persists in the area.

Seat Belts

Check that all passengers' seat belts are fastened. Passengers must be advised to fasten seat belts prior to entering areas of forecast or suspected turbulence.

Power Plant

Flying in turbulence or hail may cause engine inlet distortion. This distortion, along with engine icing, angle of attack changes, and high altitude engine surge margins can result in engine surge and flameout. Activate ignition as soon as turbulence is encountered.

Yaw Damper

Flight test data substantiates that important benefits are obtained from use of yaw damping during turbulence penetration. Excursions in sideslip and roll are minimized and, even though the rudder control may be more active, the structural loads imposed on the vertical tail are considerably reduced.

Climb

The autoflight system may be used in turbulence at the discretion of the flight crew. After takeoff and retraction of gear and flaps, use climb thrust and the recommended climb airspeed for penetration of turbulence in Chapter 2, CLIMB PROCEDURE.

Cruise

When operating in severe turbulence, select the cruise page on the FMC/CDU to obtain the recommended N1 RPM setting for penetration airspeed. If the FMC is inoperative, refer to Chapter 23, TURBULENT AIR PENETRATION charts in the CRUISE pages. Chapter 23 provides approximate RPM settings that will maintain near optimum penetration airspeed. The most important objective is to obtain an initial thrust setting close to the correct one. Once the proper thrust setting for the recommended penetration speed is achieved, it is undesirable to make thrust changes during severe turbulence. Large variations in airspeed and altitude can occur in severe turbulence.

SEVERE TURBULENCE (Cont)

Auto Flight in Severe Turbulence

When penetrating areas of severe turbulence, the autopilot should be engaged in the CWS mode. Maintain altitude and heading by manual autopilot controls. If sustained trimming occurs, disengage the autopilot.

Manual Flight in Severe Turbulence

Trim the airplane for penetration speed, then do not change stabilizer position. Control the airplane pitch attitude with the elevators using the attitude indicator as the primary instument. In extreme drafts, large attitude changes may occur. Do not make sudden large elevator control inputs. Corrective actions to regain the desired attitude should be smooth and deliberate. Altitude variations are probable in severe turbulence and should be allowed to occur if terrain clearance is adequate. Control airplane attitude first, then make corrections for airspeed, altitude and heading.

Descent

Use the recommended descent speed for penetration of turbulence in Chapter 2, DESCENT SPEEDS.

If severe turbulence is encountered at altitudes below 15,000 feet and the airplane gross weight is less than the maximum landing weight, the airplane may be slowed to 250 knots in the clean configuration. Adequate stall margin exists under these conditions.

Turbulent Air Penetration

In the event that severe turbulence is encountered:

Autothrottle ....DISENGAGE

A or B A/P Paddle ....CWS

Ignition ....ON

Activate ignition normally used prior to use of engine anti-ice.

Engine Anti-Ice Switches
(if required) ....ON

Activate engine anti-ice if temperature near or in the icing range.

Thrust ....ADJUST

Adjust thrust to maintain the recommended turbulent airspeed as required for the phase of flight. For cruise only use FMC recommended thrust setting.

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OPERATIONS MANUAL BULLETIN

THE BOEING COMPANY, SEATTLE, WASHINGTON 98124

DOCUMENT EFFECTIVITY: ALL 737-300 OPERATORS

NUMBER: 737-300 87-8
DATE: October 28, 1987

SUBJECT: ENGINE OPERATION DURING SEVERE PRECIPITATION

REASON: To advise Flight Crews of the effects of heavy rain/hail on engine operations and the requirement to maintain an adequate thrust setting to prevent possible engine flameout.

This Bulletin is issued as the need arises for alert information which requires prompt distribution. It is distributed to Operations Manual holders and to others who need early advice of changes to procedural and training information.

Information in this bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

INSTRUCTIONS: Complete the columns on the Red Bulletin Record for this bulletin at the time of filing in the Operations Manual. File this bulletin in numerical order following the Red Bulletin Record page(s). Operators other than those listed above should enter N/A in the Bulletin Status column.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT.

BACKGROUND INFORMATION

A 737-300 airplane equipped with CFM 56-3 engines experienced a two engine flameout during descent in heavy rain, hail and moderate turbulence. The airplane was descending through 8900 feet, airspeed 287 knots, TAT plus 15 degrees C, continuous ignition on, engine anti-ice off, thrust levers idle, N_1 left engine 32 percent and N_1 right engine 35 percent when the event occurred. Both engines were restarted at approximately 5000 feet, 250 knots and the flight was completed without further incident. No visible damage to either engine was detected during a post flight inspection which included a borescope inspection. Subsequent engine testing on the number one engine by CFMI did not indicate any abnormal engine characteristics or anomalies that could have caused the incident.

The levels of extremely heavy rain which may cause engine spool down or flameout are rarely encountered. During the 820 million hours of commercial jet engine operation, there have been only four reported cases of engine flameout in severe precipitation.

RECEIVED
NOV 2 1987
J. L STOPKOTTE

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OPERATIONS MANUAL BULLETIN 737-300 87-8, dated October 28, 1987 (Continued)

Analysis and testing on other fan engines have confirmed the following engine operating characteristics in severe precipitation:

- o Large concentrations of water entering the engine core at low idle RPM may result in engine flameout.
- o The higher the airspeed, the greater the concentration of water entering the engine core.
- o The higher the altitude, the less the liquid water concentration required to cause engine flameout.
- o An increase in N_1 RPM above low idle improves the engine tolerance to water ingestion.

OPERATING INSTRUCTIONS

The ENGINE OPERATION DURING SEVERE PRECIPITATION procedure in the Boeing Operations Manual will be revised to include the following information.

Extremely heavy rain/hail should be avoided: however, when extremely heavy rain/hail is encountered or anticipated, accomplish the following:

- Engine Start Switches..........FLT
- Engine Anti-ice..........ON

This action will automatically reschedule RPM to a minimum of high idle. Increasing N_1 RPM above low idle improves engine tolerance to water ingestion. Under very extreme conditions, this may not always assure protection from flameout. If practical, N_1 settings above that associated with engine anti-ice (high idle) will provide increased margins against flameout.

NOTE: Engine anti-ice may be operated at temperatures above 10°C TAT during heavy rain/hail during descent. If TAT is above 10°C, the FMC will display an appropriate advisory message in the scratch pad.

- Avoid rapid thrust lever movements to prevent engine stall.

Do not make thrust changes in extremely heavy precipitation unless excessive airspeed variations occur. If thrust changes are necessary, move thrust lever very slowly. Rapid thrust lever movements during flight in extremely heavy precipitation may cause engine stall and damage. Avoid changing thrust lever direction until engines have stabilized at a selected setting.

OPERATIONS MANUAL INFORMATION

Information in this Bulletin for operation in extremely heavy rain will be included in the Operations Manual revision tentatively scheduled for March, 1988.

NOTE: The information in this Bulletin has been coordinated with CFMI.

Attachment III

Engine Failure and Shutdown

ENGINE FAILURE AND SHUTDOWN

This condition is recognized by a loss of all thrust on an engine as indicated by the engine indicators, or airframe vibration with abnormal engine indications. It may also be specified as an action in another procedure.

Accomplish an engine shutdown only when flight conditions permit.

The power interruption during transfer bus switching may cause the associated ADI to become momentarily inoperative and the warning flags to come into view. If flags appear on the ADI of the pilot flying, the pilot not flying should be prepared to assume control. A crosscheck of both ADIs and the standby horizon should be made.

THRUST LEVER ....CLOSE
Conditions permitting, operate for three minutes at idle thrust.

AUTOTHROTTLE
(If Engaged) ....DISENGAGE
This action prevents undesired autothrottle activity.

START LEVER ....CUTOFF

APU (If Available) ......START & ON BUS

FUEL ....BALANCE

<u>If wing anti-ice is required</u>:

PACK SWITCH
(Affected Side) ....OFF

ISOLATION VALVE SWITCH ....AUTO

Accomplish the ONE ENGINE INOPERATIVE LANDING checklist.

~~ENGINE FAILURE IN THE LANDING CONFIGURATION~~

~~Should an engine failure occur during final approach with the airplane in the landing configuration, the airplane may not be able to maintain a normal glideslope under the most adverse conditions of high headwinds and climb performance limited gross weights.~~

~~Upon recognition of an engine failure, disengage the autothrottle and increase thrust on the operative engine to thrust required to maintain speed and glide path. Retract the flaps to 15 and accelerate to VREF + 15 knots. The decision to go-around or continue the approach depends on the airplane position and weather conditions.~~

~~If a decision to continue the approach is made, follow the one engine inoperative landing procedures, adjust thrust to maintain glideslope and VREF + 15 knots. In the event of a go-around, maintain VREF + 15, retract flaps to position 1, and continue the one engine inoperative go-around. VREF + 15 knots is approximately equal to V2 for flaps 1.~~

(Continued on next page)

Attachment IV

Inflight Engine Start

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INFLIGHT ENGINE START

Complete the Engine Failure and Shutdown checklist before attempting a restart.

INFLIGHT START ENVELOPE ....CHECK
Check the air start envelope to determine if a windmilling start or starter assist is required.

CAUTION: STARTER ASSIST SHOULD BE USED IF N2 IS BELOW 15 PERCENT.

THRUST LEVER ....CLOSE

If starter assist is required:

Pack Switch (Affected Side) ......OFF

DUCT PRESSURE ....MINIMUM 30 PSI

If required, advance the Thrust Lever to increase duct pressure.

Ignition Select Switch ....BOTH

START SWITCH ....GRD/FLT

START LEVER ....IDLE DETENT
Monitor engine instruments.
If normal start is not achieved, return Start Lever to CUTOFF.

After engine start:

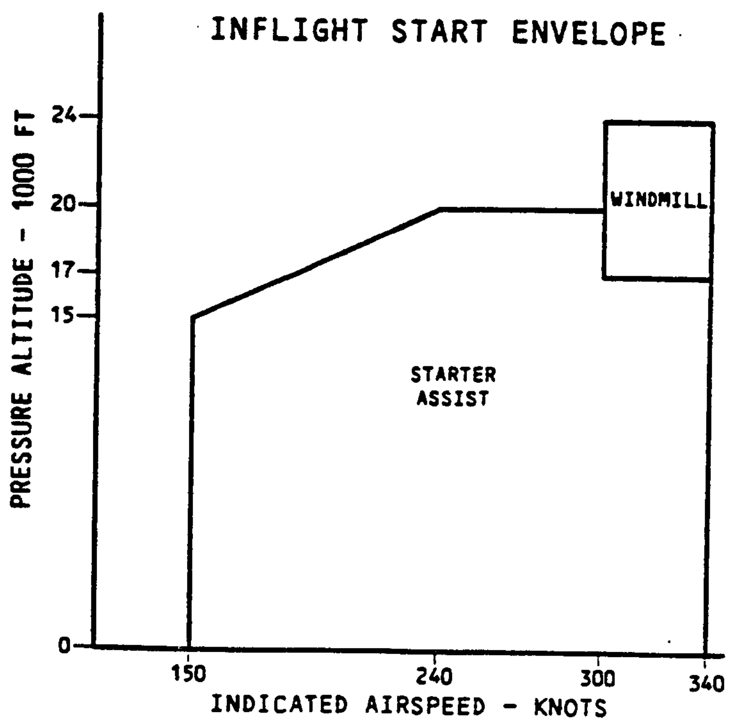
ELECTRICAL ....GENERATOR ON

PACK SWITCH ....AUTO
Configures system for normal operation.
Restores system to normal configuration if pack switch was off for wing anti-ice.

START SWITCH ....AS REQUIRED
Position to OFF unless flight conditions require use of ignition.

APU ....AS REQUIRED
Position to OFF unless required for other purposes.

INFLIGHT START ENVELOPE



Attachment V

Operations Manual Bulletin 88-5

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OPERATIONS MANUAL BULLETIN

THE BOEING COMPANY, SEATTLE, WASHINGTON 98124 **737-300**

DOCUMENT
EFFECTIVITY: All 737-300 Operators

NUMBER 88-5
DATE: June 8, 1988

SUBJECT: ENGINE OPERATION DURING MODERATE TO HEAVY PRECIPITATION

REASON: To advise flight crews of the requirement to maintain an adequate thrust setting and to use engine ignition to prevent possible engine power loss during flight in moderate to heavy precipitation.

This Bulletin is issued as the need arises for alert information which requires prompt distribution. It is distributed to Operations Manual holders and to others who need early advice of changes to procedural and training information.

Information in this bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

INSTRUCTIONS: Complete the columns on the Red Bulletin Record for this bulletin at the time of filing in the Operations Manual. File this bulletin in numerical order following the Red Bulletin Record Page(s). Operators other than those listed above should enter N/A in the Bulletin Status column.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

BACKGROUND INFORMATION

A 737-300 operator recently experienced a complete power loss on both engines during descent in an area of severe thunderstorm activity. The event occurred as the airplane encountered moderate turbulence, heavy rain, hail, and lightning at approximately 16,000 feet. Attempts to re-establish normal engine operation were unsuccessful. An emergency landing was made in a grass field without injury or airplane damage.

This is the second occurrence of a complete power loss on a 737-300 while flying in severe precipitation. The previous occurrence was in August 1987 during descent through 8,900 feet with similar weather and flight conditions. In this occurrence the engines were successfully restarted and an uneventful landing was made. While the precise cause of the complete power loss has not been established, the FAA has determined that certain operational measures can be taken as specified in Airworthiness Directive T88-13-51 which will reduce the possibility of complete power loss under these conditions. Additionally, Airworthiness Directive T88-13-51 should be consulted as it further restricts the currently approved MEL for operation in known or forecast precipitation of any intensity.

OPERATING INSTRUCTIONS

Flights should be conducted to avoid moderate to severe thunderstorm activity by overflight or circumnavigation. To the maximum extent possible, moderate to heavy rain/hail should also be avoided. Weather radar, pilot reports, and flight crew observations may be used by the flight crew to determine when moderate to heavy rain/hail is anticipated. Should flight in moderate to heavy rain/hail be encountered or anticipated, accomplish the following:

ENGINE START SWITCHES .... FLT

AUTOTHROTTLE .... DISENGAGE

MINIMUM ENGINE N1 .... 45 PERCENT
Increasing engine RPM to 45 percent N1 improves engine tolerance to water ingestion.

Avoid rapid thrust lever movements to prevent engine stall or flameout.

Do not make rapid thrust changes in extremely heavy precipitation unless excessive airspeed variations occur. If thrust changes are necessary, move the thrust lever very slowly. Avoid changing thrust lever direction until engines have stabilized at a selected setting.

OPERATIONS MANUAL INFORMATION

This revised information for operation in moderate to heavy precipitation will be incorporated in the next formal operations manual revision.

This Bulletin has been coordinated with CFMI.

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Attachment VI

Operations Manual Bulletin 88-6

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OPERATIONS MANUAL BULLETIN

THE BOEING COMPANY, SEATTLE, WASHINGTON 98124

737-300

DOCUMENT EFFECTIVITY: All 737-300 Operators

NUMBER 88-6
DATE: June 17, 1988

SUBJECT: LOSS OF BOTH ENGINES

REASON: To provide flight crews with a procedure to restore normal engine operation in the event thrust or thrust lever response is lost from both engines.

This Bulletin is issued as the need arises for alert information which requires prompt distribution. It is distributed to Operations Manual holders and to others who need early advice of changes to procedural and training information.

Information in this bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

INSTRUCTIONS: Complete the columns on the Red Bulletin Record for this bulletin at the time of filing in the Operations Manual. File this bulletin in numerical order following the Red Bulletin Record Page(s). Operators other than those listed above should enter N/A in the Bulletin Status column.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

BACKGROUND INFORMATION:

The purpose of this Operations Manual Bulletin is to establish a procedure to restore normal engine operation in the event thrust or thrust lever response is lost from both engines. The procedure includes recall items to be accomplished expeditiously to affect an immediate restart before the engines have spooled down completely. If this is unsuccessful, the procedure becomes a reference procedure to establish 260-280 kts, flight conditions permitting, and to close the thrust levers. The 260-280 knot airspeed recommendation provides airflow to assist in windmilling the engine for start, and closing the thrust levers improves restart capability. Finally, if the APU is available and previous attempts have been unsuccessful, the procedure contains steps to use the APU to power the electrical system and to provide a pneumatic air source to restart the Number 1 (left) engine using starter assist. The airplane's flight path can then be restored, and the other engine started by accomplishing the INFLIGHT ENGINE START checklist..

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OPERATING INSTRUCTIONS:

If thrust or thrust lever response is lost from both engines, accomplish the following:

LOSS OF BOTH ENGINES

This condition is recognized by the loss of thrust or thrust lever response from both engines which may first be indicated by the illumination of the LOW OIL PRESSURE and/or BUS OFF lights..

START SWITCHES	FLT
START LEVERS	CUTOFF THEN IDLE

Monitor engine instruments. If no increase in EGT is observed within 15 seconds, return Start Lever(s) to CUTOFF.

Do not allow the EGT to exceed the takeoff EGT limit (930°C).

If either engine starts:

Accomplish the INFLIGHT ENGINE START checklist to start the other engine.

If both engines fail to start

AIRSPEED (Flight conditions permitting) .... 260-280 KTS

THRUST LEVERS .... CLOSE

START LEVERS .... CUTOFF THEN IDLE
Monitor engine instruments. If no increase in EGT is observed within 15 seconds, return Start Lever(s) to CUTOFF.

If restart is not successful on either engine:

APU (If available) .... START AND ON BUS
The APU generator powers the respective Generator Bus and both Transfer Busses. This provides electrical power to both igniters on each engine.

ISOLATION VALVE SWITCH .... CLOSE

LEFT AIR CONDITIONING PACK SWITCH .... OFF

ENGINE NO. 1 BLEED AIR SWITCH .... OFF

APU BLEED AIR SWITCH .... ON

IGNITION SELECT SWITCH .... BOTH

ENGINE NO. 1 START SWITCH .... GRD

START LEVER .... IDLE
Monitor engine instruments. If no increase in EGT is observed within 30 seconds, return the Start Lever to CUTOFF.

When engine parameters have stabilized:

ENGINE THRUST LEVER .... ADVANCE

GENERATOR NO. 1 SWITCH .... ON

APU BLEED AIR SWITCH .... OFF

ENGINE BLEED AIR SWITCH .... ON

LEFT AIR CONDITIONING PACK SWITCH .... AUTO

ISOLATION VALVE SWITCH .... AUTO

Accomplish the INFLIGHT ENGINE START checklist to start the Number 2 Engine.

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OPERATIONS MANUAL INFORMATION

This bulletin provides a new procedure for LOSS OF BOTH ENGINES and a temporary QRH checklist page for LOSS OF BOTH ENGINES. This information will be incorporated into the Operations Manual during the next formal revision.

SPECIAL INSTRUCTIONS

Insert the attached temporary QRH page following 05.06.

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Powerplant Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

June 14, 1990

JUL 7 1990

POWERPLANT GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

A. ACCIDENT

Location:	New Orleans, Louisiana
Date:	May 24, 1988
Operator:	TACA International Airlines, S.A.
Aircraft:	Boeing 737-300, N75356

B. POWERPLANT GROUP

John G. Young	Group Chairman, NTSB
John Able	Federal Aviation Administration
Jerome P. Clark	General Electric Aircraft Engines
Michael Charier	CFM International
Cliff Schjoneman	Boeing Commercial Aircraft Co.
Mauricio Machado	TACA

C. SUMMARY

On May 24, 1988, at about 1256 CDT, a TACA International Airlines Boeing 737-300 N75356, flight 110, landed safely, gear down on a grass area next to a Mississippi River levee near New Orleans, Louisiana, following total power loss in both engines. During descent for landing at New Orleans, at about 16,000 feet m.s.l., the flight encountered moderate to heavy hail and heavy rain. Engine anti-ice was on, engine ignition "continuous", and auto throttles engaged.

During the encounter with heavy rain, both engines flamed out. Several re-start attempts were unsuccessful in that, although ignition occurred, the engines would not accelerate to flight idle and exhaust gas temperature (EGT) reached maximum limits. Restart attempts were abandoned and a successful power-off landing was made.

Subsequent ground testing verified normal bleed air system function, proper engine ignition system operation, correct fuel system operation and engine indicating system operation. Engine disassembly and examination revealed severe overtemperature damage to the low pressure turbine of No. 2 engine, serial number 721-973. Extensive borescope inspection of No. 1 engine, serial number 721-971, revealed no apparent damage. Engine 721-971 was released to CFMI/GE for water ingestion testing.

D. ENGINE HISTORICAL DATA

Position	Model	S/N	TSN(hours)	CSN(cycles)
1	CFM 56-3	721-971	80.7	60
2	CFM 56-3	721-973	80.7	60

E. DETAILS OF INVESTIGATION

1. On Site

Both engines were inspected visually. The No. 1 fan rotor was free to rotate by hand. The No. 2 fan rotor would bind when rotated by hand. The core rotors (HP) of both engines could be rotated by the starter drive. There was loose metal in the tailpipe of the No. 2 engine and some bowed trailing edges were observed on the 4th stage low pressure turbine (LPT) vanes. A complete borescope inspection of both engines revealed no apparent damage to the No. 1 engine, and LPT nozzle guide vane melting and metal impingement on the LPT blades of the No. 2 engine.

Several locked fan rotor start tests were made on-site prior to engine removal. This check was accomplished to check the start stall margin of the core engine (HP compressor and turbine). It was accomplished by strapping the fan blades to the fan exit guide vanes to prevent fan rotation while the core was started and stabilized at ground idle. All these starts were satisfactory with no start stall evident. Tests were also conducted to verify ignition system and ignitor plug normal operation, with no discrepancies noted, and fuel suction feed tests were accomplished to verify fuel pump impeller performance.

Arrangements were made, with NTSB concurrence, between TACA and CFMI/GE to release the No. 1 engine S/N 721-971 to GE for water ingestion testing. The no. 2 engine was shipped to Aviall, Dallas, Texas for disassembly and examination.

2. No. 2 Engine Teardown Examination

A complete borescope inspection was accomplished which revealed considerable overtemperature damage in the LPT but no damage in the HPT, combustor, or compressor. Therefore, only the LPT module was removed and disassembled.

All four turbine stages had similar damage, with nozzle guide vane (NGV) leading edges burned and trailing edges bowed, and rub on both inner and outer stationary air seals. In all stages the NGV damage was located in two areas, one about the 5 o'clock position and one about the 9 O'clock position.[1] The starting enrichment fuel nozzles are located (2 each) at the 4 to 4:30 o'clock position and (2 each) at the 8 to 8:30 o'clock position. The turbine blades in each stage did not exhibit overtemperature damage such as melting or distortion. However, the blades in the first two stages were coated with molten metal splatter and slag deposits. The third stage blade leading edges and camber faces were rough and eroded. The fourth stage blades appeared normal and undamaged.

The variable stator vane rigging and the variable bleed valve rigging were checked and found satisfactory, and the fifth stage bleed valve functioned normally. The main engine control was also bench checked and found to function properly within serviceable limits.

3. General Electric/CFMI Water Ingestion Testing

The No. 1 engine was transported to the General Electric test facility at Peebles, Ohio where it and a CFM56-3 development engine were used in a lengthy water ingestion test program and later in a flight test program which also involved water ingestion. This testing confirmed that the CFM56-3 exceeded the CFR 14 Part 33 certification requirements for water ingestion. It also confirmed that at both approach idle and flight idle power at water ingestion rates likely to be encountered in level 4 and 5 thunderstorms, core engine speed would decrease below minimum self-sustaining speed even though partial combustion continued in the combustor. When the power lever was advanced in this condition during testing the engine would not accelerate; however, exhaust gas temperature rose significantly, and low pressure turbine overtemperature occurred.

The test program also demonstrated that high inlet water-to-air ratios (above 12%) increase the engine operating line significantly at low power settings and could cause speed roll back to below self sustaining speed.(Attachment 2) It also demonstrated that at engine speeds of 45% N or greater water ingestion capability was increased by a factor greater than two. That is, the engine can tolerate more than twice the water- to-air ratio at flight idle without flameout or roll back. It was also determined that if the fuel was shut off when the speed was rolled back, then the complete restart procedure was followed, the engine could be restarted without excessive temperature rise, even with high water ingestion rates. (Attachment 3,4)

The CFM56 engine fan rotor consists of the fan stage and a 3-stage booster driven by the LPT. The inlet guide vanes for the booster stage are located immediately behind the fan blades. Their outer support incorporates an aerodynamically shaped fairing, or flow splitter, which separates the air flow into the core engine and the bypass air into the fan duct.

---

1 All clock positions relate to the engine viewed aft looking forward (ALF)

To reduce air flow leakage from the core flow into the bypass flow, and increase efficiency, the axial clearance between the splitter and fan blade trailing edges was kept very small. The water ingestion test program revealed that at high water ingestion rates the splitter trapped and directed into the core engine most of the water coming off the spinner and fan blades within the capture area of the splitter diameter.

Shortly after the TACA incident, the Boeing Company issued an operation bulletin recommending that N, speeds be maintained at 45 percent or greater during flight in heavy precipitation, with the auto throttles off. The Federal Aviation Administration issued an Airworthiness Directive which made this procedure mandatory by requiring an Airplane Flight Manual revision.

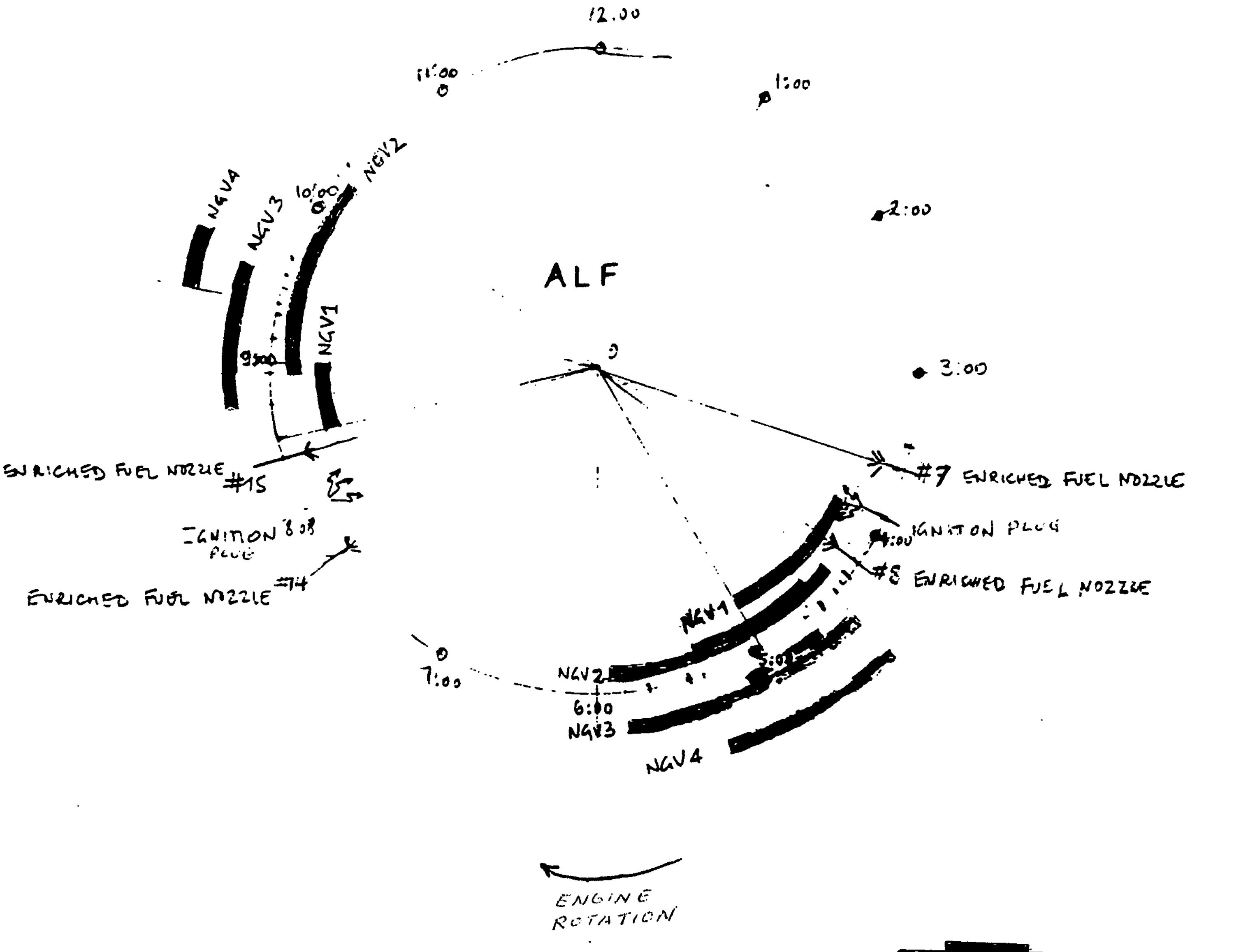
When the test program identified the splitter capture as the cause for the high water flow into the core compressor, CFMI developed a new splitter configuration which increased the clearance between fan blade trailing edges and splitter leading edge from 0.63 inch to 1.32 inches. This was immediately introduced into production, and retrofit parts were made available to operators.

[redacted]

John G. Young
Air Safety Investigation

CFM56-3B1 721 973 16

TACA



RANGE OF NGV
OVERTEMPERATURE DAMAGE
LOW PRESSURE TURBINE

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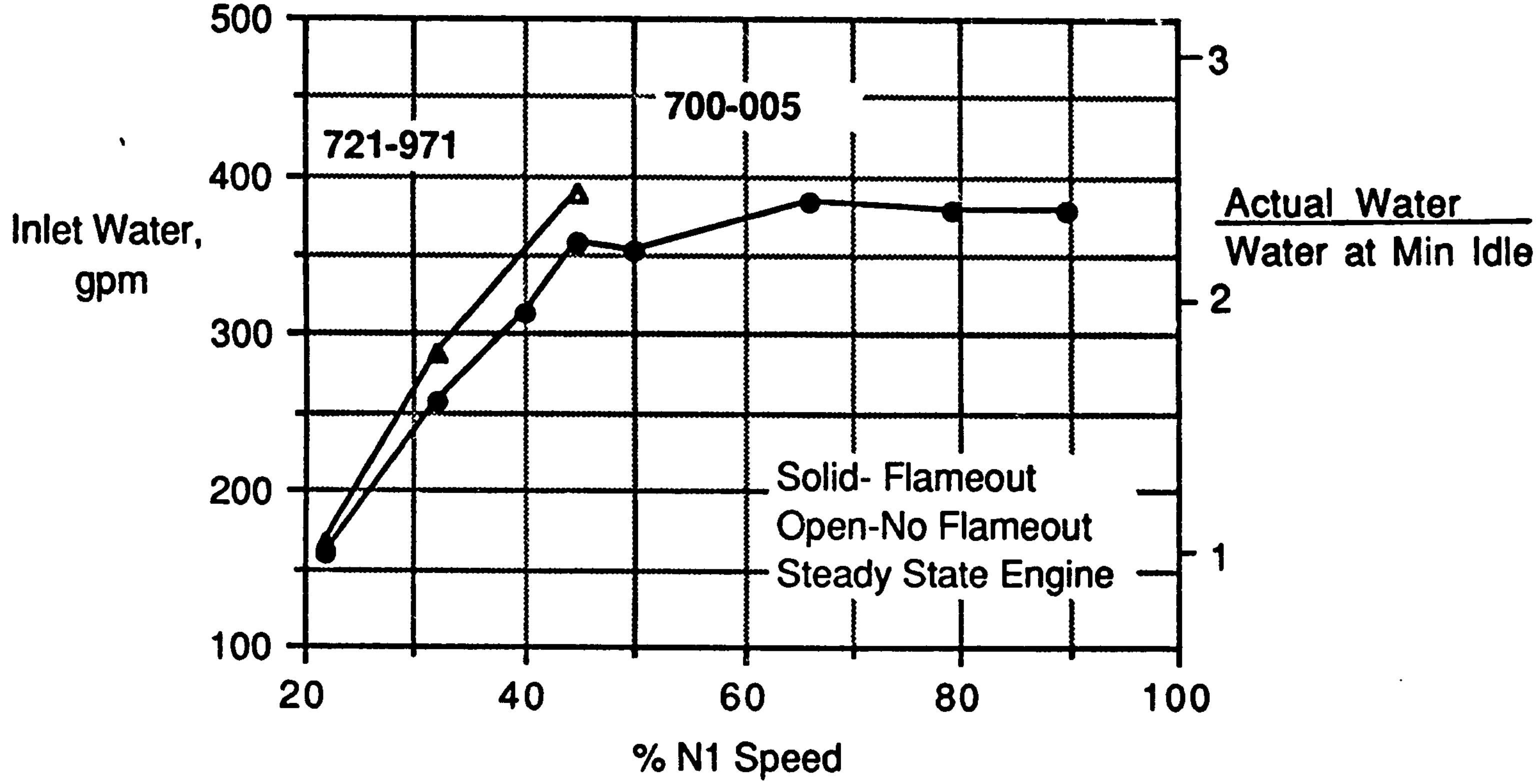
ATTACHMENT 1

cfm international

EFFECT OF ENGINE SPEED ON WATER INGESTION CAPABILITY



0 INCREASE STEADY STATE N1 FROM MIN IDLE TO 45% N1 IMPROVES WATER INGESTION CAPABILITY BY FACTOR GREATER THAN 2.

0 SUBSTANTIATES AIRWORTHINESS DIRECTIVE FOR SELECTION OF 45% N1 IN PRECIPITATION

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CFMI PROPRIETARY

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ATTACHMENT 2

ENGINE STARTING WITH WATER INGESTION

O GENERAL COMPARISON OF ENGINE STARTING CHARACTERISTICS -- DRY AND WET

	DRY	WET
LIGHTOFF TO IDLE TIME	NORMAL	- INCREASED
START STALL MARGIN	NORMAL	- NEGLIGIBLE DIFFERENCES
COMBUSTION EFFICIENCY	NORMAL	- DECREASED
		- GREATER LIKELIHOOD OF HUNG STARTS OR NO LIGHTOFF CONDITION
IGNITION	NORMAL	- DUAL IGNITORS IMPROVES LIGHTOFF

ATTACHMENT 3

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LOW PRESSURE TURBINE DAMAGE

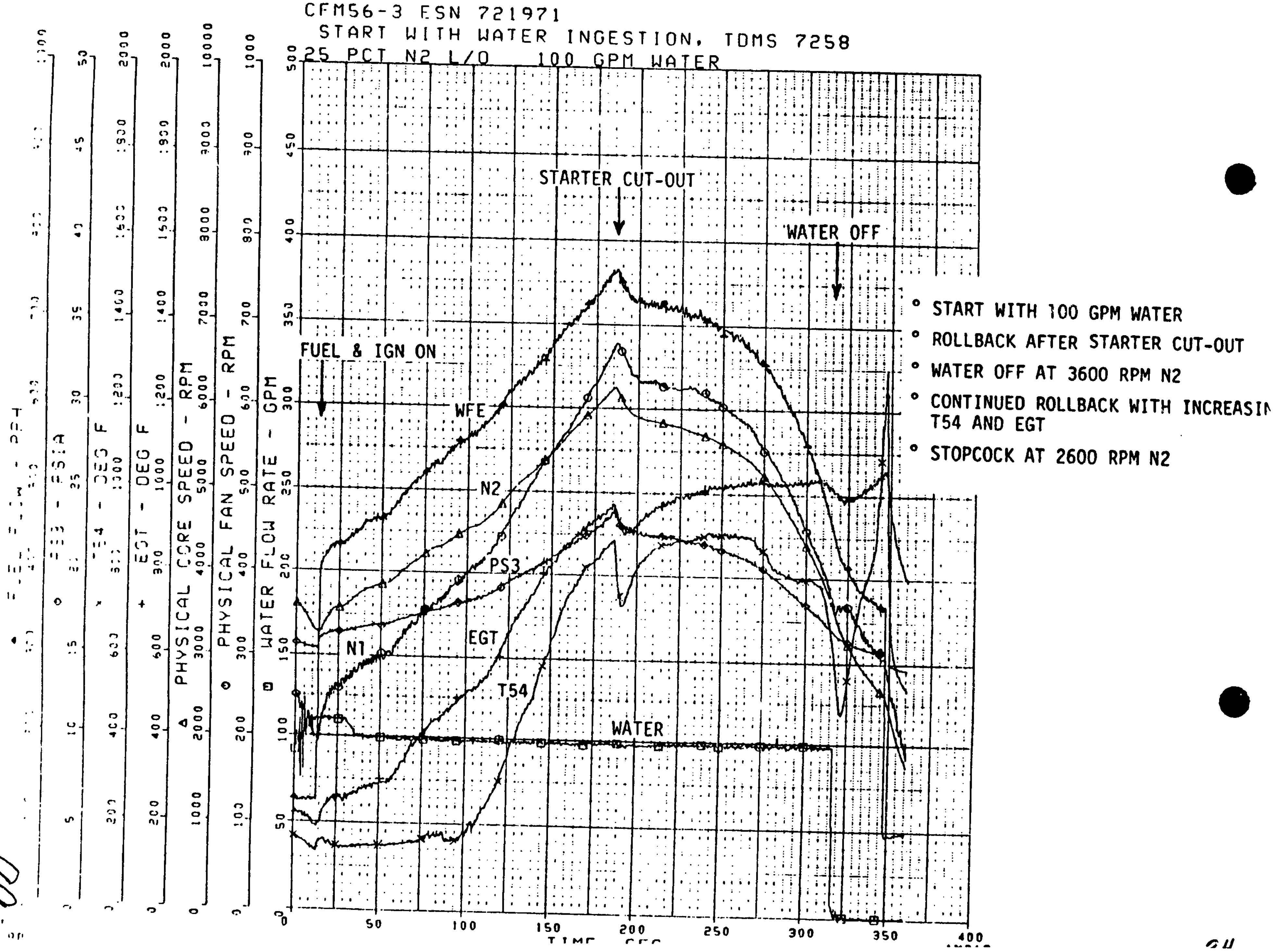
- 0 ONE TACA AND ONE CONTINENTAL ENGINE LPT HAD OVERTEMP DAMAGE
- 0 GROUND TESTING/ANALYSIS INDICATES:
  - 0 LPT DAMAGE BELIEVED SECONDARY - NOT INVOLVED IN COMPLETE POWER LOSS
  - 0 WATER INDUCED RUNDOWN DEMONSTRATED WITH BURNER STILL PARTIALLY LIT
  - 0 ENGINE RUNDOWN BELOW MIN SUSTAINING SPEED
  - 0 CANNOT ACCELERATE
  - 0 LPT BURNING POSSIBLE IF FUEL NOT SHUT OFF

RECOMMENDED PILOT ACTION AS SOON AS POWER LOSS RECOGNIZED

- 0 MOVE START LEVER TO CUT-OFF
- 0 THEN USE RESTART PROCEDURE

cf) international

CFMI . ?OPRIETARY

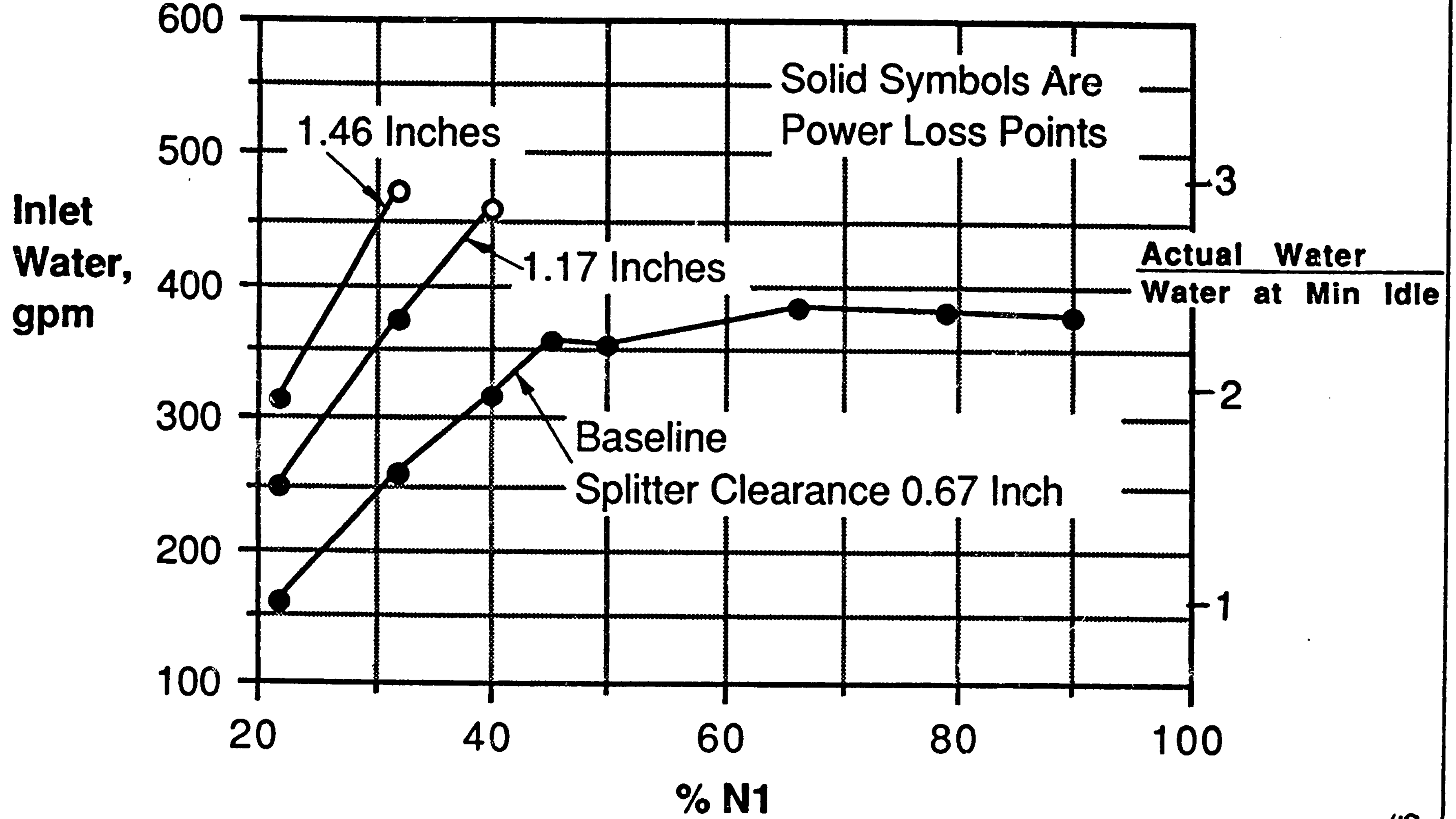


ATTACHMENT 5

99

cfi . international

EFFECT OF ROTOR-SPLITTER SPACING ON WATER INGESTION CAPABILITY



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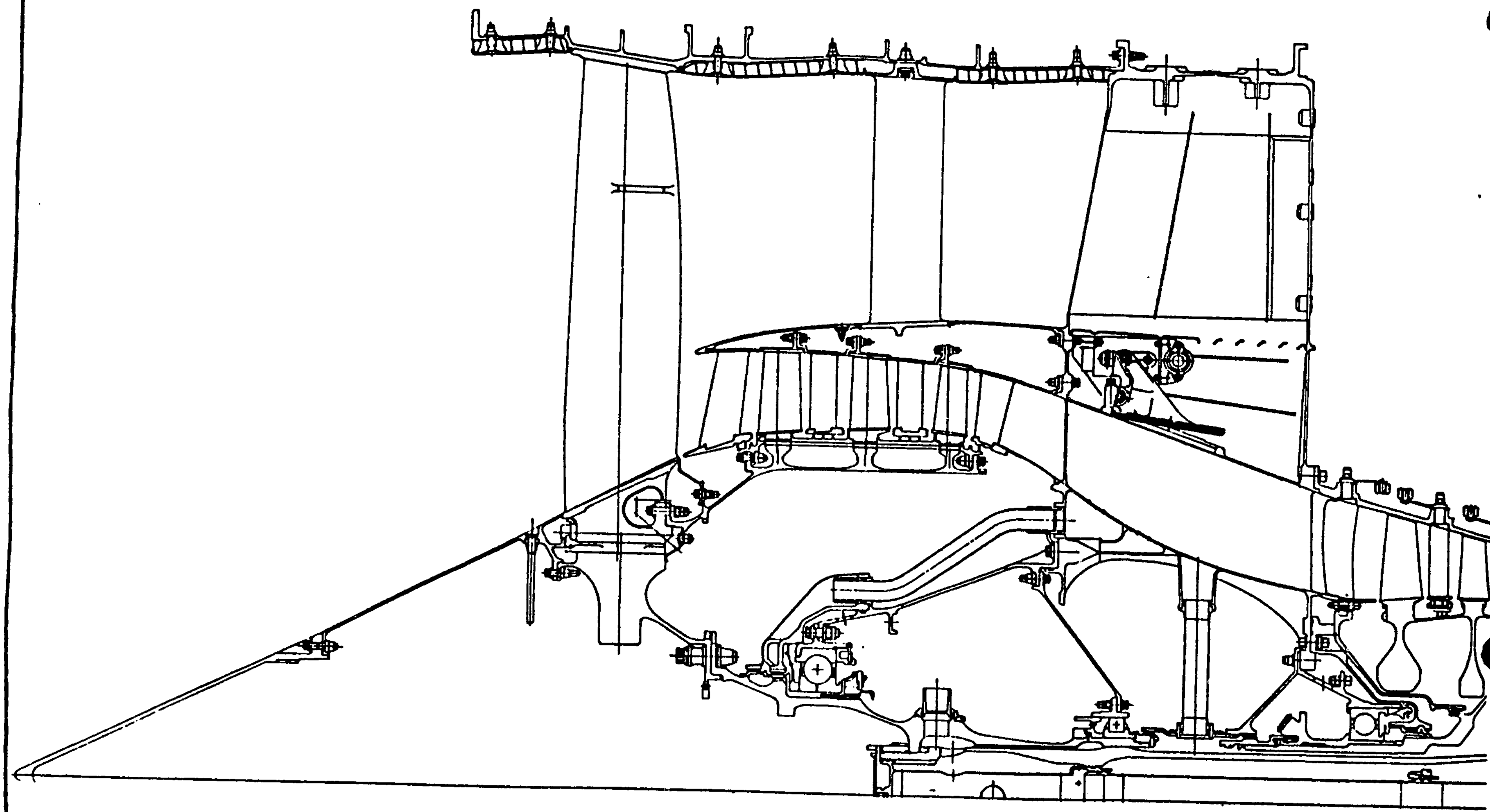
CFMI PROPRIETARY

ATTACHMENT 6

10

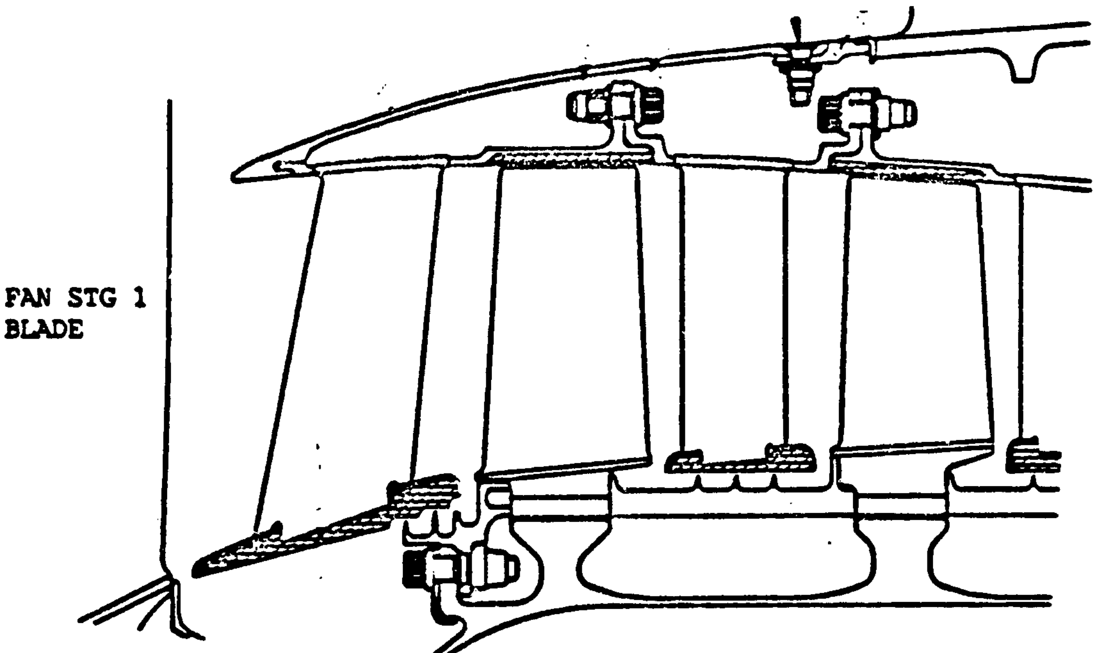
cfm international

CFM56-3

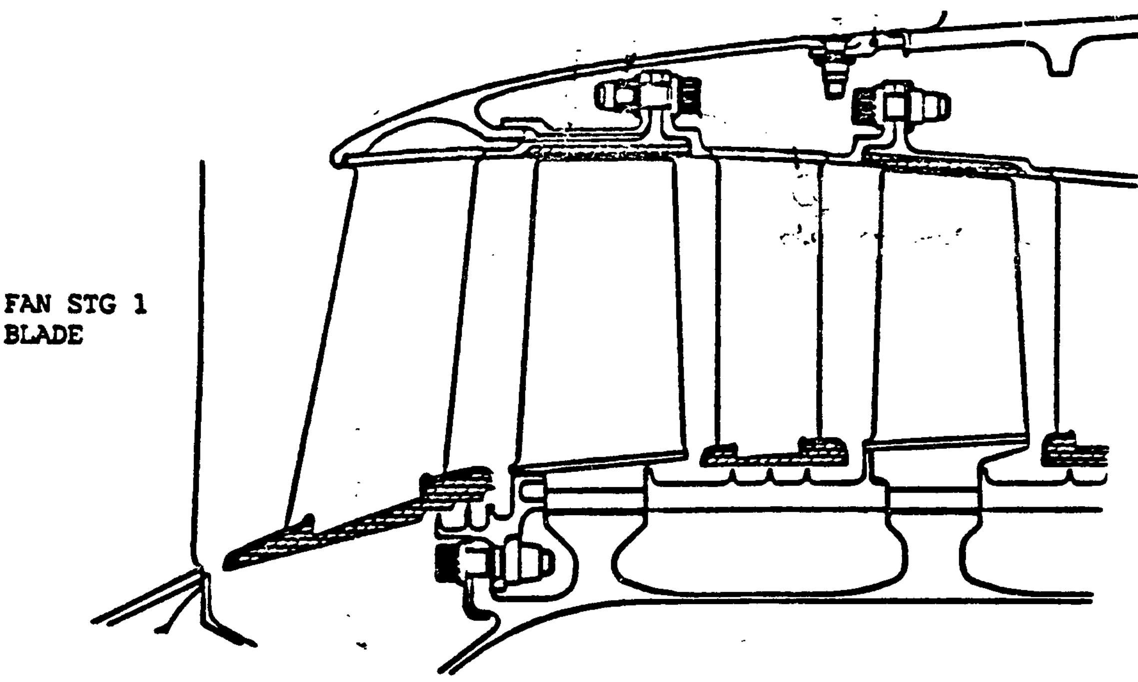


ATTACHMENT 7

101



ORIGINAL SPLITTER CONFIGURATION



MODIFIED SPLITTER CONFIGURATION

ATTACHMENT 8

FDR Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D.C. 20594

June 15, 1988

FLIGHT DATA RECORDER FACTUAL REPORT OF INVESTIGATION
FTW-88-M-A-109

A. ACCIDENT

Location: New Orleans, Louisiana
Date : May 24, 1988
Time : 12:56 (local)
Aircraft: TACA Airlines, Flight 110, Boeing 737-300, N75356

B. GROUP

Dennis Grossi - Group Chairman, N.T.S.B.
Glen Dail - Member, Federal Aviation Administration
William Thompson - Member, G. E. Aircraft Engines

C. SUMMARY

The flight data recorder, a Sundstrand UFDR (s/n 3955), was removed from the aircraft following the accident. The recorder was sent to the Safety Board's laboratory in Washington, D.C. for readout and evaluation.

D. DETAILS OF INVESTIGATION

1. Description of Data

This model flight recorder records altitude, airspeed, heading, vertical acceleration and microphone keying in digital format on 1/4 inch magnetic tape. The parameters of altitude, heading and microphone keying are sampled once per second. Indicated airspeed (IAS) and vertical acceleration are sampled 2 and 8 times per second, respectively.

The data are formatted into frames and subframes. A subframe is comprised of 64 12-bit words recorded every second. A group of 4 subframes comprise a frame. Each subframe has a unique (Barker code) 12-bit synchronization (sync) word identifying it as subframe 1,2,3 or 4. The data stream is "in sync" when successive sync words appear at 64-word intervals. If the data stream is interrupted, the sync words will not appear at the proper interval or sequence, and sync will be lost along with the affected data.

Each data parameter (e.g., altitude, airspeed, heading) has a specifically assigned word number within the subframe.

The last 25 hours of recorder operation are retained on the recording medium. This is accomplished by erasing the oldest data and replacing it with the newest.

2. Examination of Recorder

The flight recorder was examined and found to be undamaged, with no evidence of excessive wear.

3. Readout and Evaluation

a. Readout

A copy of the entire 25 hours of data was made on 1/4 inch magnetic tape. The data of interest were located and transcribed from the copy tape to 1/2-inch magnetic tape for further processing.

The data were reduced from the recorded decimal values (0 to 4095) to engineering units (e.g., feet, knots, etc) by conversion formulas obtained from the recorder manufacturer. The actual conversion is accomplished by an automated process that incorporates the laboratory's computer and associated software.

b. Evaluation

An examination of the recovered data indicates that the recorder operated normally. However, the data displayed the following anomalies:

FRAME	SUBFRAME	ANOMALIES
379	1	Erroneous altitude value.
381	2	Erroneous IAS value.
388	2	Sync loss with power loss as indicated by zeroing of the frame counter.
343	3	Erroneous altitude and airspeed values.
348	4	Erroneous altitude value.
403	1	Sync loss starting at word 16 thru 64 sync not regained until frame 404 subframe 1, (no power loss).
424	2	IAS word 51 and vertical acceleration words 26, 34, 42 and 50 are erroneous.
502	4	Sync loss, 4 seconds of data are missing, reference frame counter.

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FRAME	SUBFRAME	ANOMALIES
506	1	Erroneous altitude value
527	3	Transition to 25 hour old data.

The sync loss in frame 348 is consistent with a sustained interruption in recorder power associated with the loss of both engines. The reason or reasons for the remaining anomalies is unknown.

4. Data Printout

A printout of all parameters is contained in Attachment I. The data cover a 13 minute, 7 second period during the descent from 20,000 feet through the landing. The aforementioned out-of-sync and erroneous data points have been lined out.

5. Data Plots

A plot of the data from elapsed time 0024:00 to 0032:00 is contained in Attachment I. The plot program is limited to addressing 4 samples per second, thus the 8 samples per second, Vertical "G" data were divided into 2 separate files and plotted individually on the same axis. The aforementioned data errors, or anomalies, were noted on the plot as follows:

(a) Erroneous Altitude value at elapsed time 0025:12

(b) Erroneous IAS value at elapsed time 0025:21.3

(c) Erroneous IAS value at elapsed time 0025:33.8 (sync loss)

(d) Erroneous vertical "G" values at elapsed time 0025:33.4 thru 0025:33.9 (sync loss)

(e) Erroneous IAS and altitude values at elapsed time 0025:34

(f) Erroneous altitude values at elapsed time 0025:35

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Attachments

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ATTACHMENT
Data Printout

ENGINEERING UNITS DUMP
DUMP VARIABLE DICTIONARY

MNEMONIC	PARAMETER NAME	ENGINEERING UNITS
ALT EL	PRESSURE ALTITUDE	FEET
IAS H	COMPUTED AIR SPEED 'H'	KNOTS
HEAD	MAGNETIC HEADING	DEG
VERG1H	VERTICAL ACCELERATION'H'	G'S
VERG2H	VERTICAL ACCELERATION'H'	G'S
FRMMSB	FRAME COUNTS MSB	MSB
FRMLSB	FRAME COUNTS LSB	LSB

END OF PARAMETER LIST THIS PASS

BEGINNING DUMP OF PASS PARAMETERS

NTSB DATA DUMP PROGRAM PAGE 1

27-MAY-88 TACA B737-300 [redacted] 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
331.	00:22	01:01	20000.	267.06	268.32	331.41	0.9671	0.9816	0.9088	0.8797	1.0399	0.9962	0.9962	0.9962	1.0	2701.0
			19992.	267.06	266.36	331.41	0.9671	0.9962	0.9525	0.9671	0.9962	0.9671	0.9962	0.9962	1.0	2702.0
			19969.	266.24	265.77	331.41	1.0544	0.9234	0.9088	1.0544	0.9962	1.0253	0.9962	0.9816	1.0	2703.0
			19958.	266.13	266.83	331.41	1.0253	0.9671	0.9671	0.9962	1.0253	1.0399	0.9688	1.0399	1.0	2704.0
332.	00:22	01:01	19936.	266.59	266.94	331.41	0.9816	0.9962	0.9962	1.0981	1.0836	0.9816	0.9816	0.9962	1.0	2705.0
			19919.	267.41	267.75	331.41	0.9962	0.9816	1.0836	1.0690	1.0544	0.9525	0.9962	0.9962	1.0	2706.0
			19905.	267.64	266.24	331.41	0.9816	0.9671	0.9525	0.9962	1.0253	0.9234	0.8797	0.8943	1.0	2707.0
			19885.	266.01	266.48	331.76	1.0544	0.8943	0.8797	1.0544	1.0253	0.9380	1.0981	1.0690	1.0	2708.0
333.	00:22	01:01	19870.	266.59	266.24	331.07	0.9671	1.0253	0.9671	1.0690	0.9671	0.9962	0.9962	1.0399	1.0	2709.0
			19852.	266.59	266.94	331.41	1.0399	0.9962	1.0399	0.9380	1.0399	0.9380	1.0836	0.8943	1.0	2710.0
			19840.	267.06	267.64	331.41	0.8652	0.9234	0.9962	0.9671	1.0399	0.9816	1.0399	0.9671	1.0	2711.0
			19824.	267.06	267.75	331.07	0.9816	1.0544	0.9088	0.9088	1.0690	1.0690	0.9380	1.0399	1.0	2712.0
334.	00:22	01:01	19805.	267.06	268.89	331.76	0.9962	0.9816	0.9816	0.9962	0.9671	0.9671	0.9671	0.9816	1.0	2713.0
			19786.	268.32	267.75	331.41	0.9962	1.0544	1.0544	1.0690	0.9962	0.9671	0.9671	0.9671	1.0	2714.0
			19766.	267.87	268.21	331.41	0.9671	0.9816	0.9671	0.9671	0.9962	1.0399	1.0399	0.9962	1.0	2715.0
			19747.	268.44	268.21	331.41	0.9671	1.0981	1.0690	0.9671	0.9816	0.9088	1.0690	0.9234	1.0	2716.0
335.	00:22	01:01	19734.	269.00	268.32	331.76	0.8943	1.0690	0.9380	0.9525	0.9525	0.9671	0.9671	0.9671	1.0	2717.0
			19713.	267.52	267.06	331.76	0.9671	0.9816	0.9671	0.9962	1.0253	0.9380	1.0544	0.9962	1.0	2718.0
			19695.	267.06	266.59	331.76	0.9816	1.0399	0.9962	0.9816	0.9816	0.9962	0.9962	1.0399	1.0	2719.0
			19674.	266.24	266.71	331.76	0.9962	1.0399	0.9380	1.0544	0.9380	0.9962	0.9380	0.9962	1.0	2720.0
336.	00:22	01:01	19657.	266.24	265.65	332.11	0.9962	1.0399	1.0108	0.9962	0.9671	0.9962	0.9962	0.9962	1.0	2721.0
			19638.	265.18	265.06	331.76	1.0399	0.9962	0.9816	0.9671	0.9671	0.9671	0.9962	0.9816	1.0	2722.0
			19617.	265.18	265.30	331.76	1.0253	0.9962	0.9962	0.9962	0.9962	0.9816	0.9816	0.9671	1.0	2723.0
			19603.	264.46	264.34	331.76	0.9816	0.9962	0.9671	1.0690	1.0836	0.9962	0.9962	0.9962	1.0	2724.0
337.	00:22	01:01	19585.	264.70	266.71	331.76	0.9962	1.0544	1.0690	1.0399	1.0544	1.0544	0.9962	0.9962	1.0	2725.0
			19569.	266.48	266.83	331.76	0.9816	0.9816	0.9816	0.9962	0.9962	0.9962	0.9962	1.0253	1.0	2726.0
			19553.	267.29	266.24	331.07	1.0253	0.9962	0.9962	1.0253	0.9671	1.0399	0.9671	0.9816	1.0	2727.0
			19533.	266.24	266.01	331.07	1.0399	0.9088	1.0690	0.9380	0.9816	1.0399	0.9962	0.9962	1.0	2728.0
338.	00:22	01:01	19520.	265.54	264.70	331.41	1.0544	0.9962	0.9962	0.9671	0.9816	0.9816	0.9962	1.0399	1.0	2729.0
			19497.	265.65	265.18	331.41	0.9962	0.8943	0.8943	1.0399	0.9671	0.9671	0.9671	1.1127	1.0	2730.0
			19480.	266.48	267.06	331.76	1.0690	0.9671	1.0399	0.8797	0.8797	0.9234	0.9088	1.0253	1.0	2731.0
			19466.	266.71	266.59	331.41	0.9671	0.9380	0.9671	0.9671	0.9962	0.9816	0.9671	0.9962	1.0	2732.0
339.	00:22	01:01	19446.	266.83	266.36	331.41	0.9816	0.9671	0.9962	1.0690	0.9816	1.0399	1.0544	0.9962	1.0	2733.0
			19433.	267.18	267.29	331.41	1.0690	0.9962	1.0399	1.0544	1.0544	1.0253	0.9671	0.9962	1.0	2734.0
			19409.	266.36	266.83	331.76	0.9380	0.9671	1.1127	1.0981	0.9525	1.0399	1.0253	0.9816	1.0	2735.0
			19394.	266.83	266.59	331.41	0.9962	1.0690	1.0690	0.9962	0.9671	0.9962	0.9816	0.9962	1.0	2736.0
340.	00:22	01:01	19377.	266.13	266.71	331.76	0.9962	0.9962	0.9962	0.9962	0.9816	0.9816	0.9525	0.9671	1.0	2737.0
			19357.	266.36	266.13	332.11	0.9962	0.9380	0.9962	0.9671	0.9671	0.9962	0.9671	0.9816	1.0	2738.0
			19340.	265.42	265.89	331.76	1.0253	0.9816	0.9816	1.0399	0.9816	1.0253	1.0399	0.9962	1.0	2739.0
			19327.	266.24	266.71	331.76	0.9816	0.9962	0.9671	1.0544	0.9962	0.9671	0.9962	0.9671	1.0	2740.0
341.	00:22	01:01	19308.	266.71	266.83	331.41	0.9380	0.9380	0.9962	0.9671	0.9962	0.9962	0.9962	0.9671	1.0	2741.0
			19293.	266.24	267.52	331.41	0.9671	0.9671	0.9671	1.0399	0.9380	1.0544	0.9671	0.9816	1.0	2742.0
			19278.	268.32	267.64	331.76	1.0399	1.0690	0.9234	0.9816	0.9525	1.0836	0.9380	0.9816	1.0	2743.0
			19259.	267.87	268.55	331.76	0.9962	1.0399	0.9816	0.9962	1.0253	0.9962	1.0399	1.0399	1.0	2744.0
342.	00:22	01:01	19247.	268.21	268.55	331.41	1.0253	1.0253	0.9671	0.9671	0.9671	0.9234	1.0253	0.9962	1.0	2745.0
			19237.	268.32	268.44	331.41	0.9671	0.9962	0.9380	0.9816	0.9525	0.9962	0.9962	0.9525	1.0	2746.0
			19221.	268.21	267.98	331.07	0.9380	0.9088	0.9380	0.9671	0.9962	0.9525	0.9962	1.0690	1.0	2747.0
			19210.	267.41	267.41	331.41	1.0253	0.9962	0.9671	0.9380	0.8943	0.8652	1.0836	0.8506	1.0	2748.0
343.	00:22	01:01	19190.	266.83	266.59	331.41	1.1127	1.0690	1.0399	0.9525	0.9525	0.9380	0.9525	1.0836	1.0	2749.0
			19168.	266.71	265.65	331.41	1.0253	1.0399	1.0544	0.8797	0.8652	1.0836	1.0690	0.9525	1.0	2750.0
			19154.	266.24	267.06	331.76	0.9816	0.9525	0.9816	0.9816	0.9962	0.9962	0.9962	1.0836	1.0	2751.0
			19136.	265.89	265.65	331.76	0.9380	0.9234	1.0399	1.0544	0.9380	0.9671	0.9671	1.0399	1.0	2752.0
344.	00:22	01:01	19120.	266.36	265.65	331.41	1.0690	0.9380	0.9234	0.9088	0.9380	1.0253	0.9816	0.9816	1.0	2753.0
			19097.	265.65	266.13	331.76	1.0690	0.9816	0.9816	0.9671	0.9962	1.0836	1.0544	0.9962	1.0	2754.0
			19077.	266.01	266.24	331.76	1.0399	1.0253	1.0399	1.0690	1.0544	1.0253	1.0399	0.9525	1.0	2755.0
			19057.	267.18	267.29	331.41	1.0836	0.9671	1.0690	1.1127	0.9380	0.9671	0.9671	0.9962	1.0	2756.0
345.	00:22	01:01	19039.	267.41	267.06	331.76	1.0836	0.9234	1.0836	0.9088	1.0399	1.0690	1.1272	1.0836	1.0	2757.0
			19021.	267.41	267.75	331.41	1.0836	0.9671	0.9962	0.9525	0.9380	1.0399	1.0399	0.9380	1.0	2758.0
			19008.	267.98	267.98	331.07	1.0690	0.9671	0.9962	0.9816	0.9816	1.0399	1.0108	0.9962	1.0	2759.0
			18986.	268.55	267.75	331.07	0.9816	1.0399	1.0690	1.0544	1.0399	1.0399	1.0399	0.9816	1.0	2760.0

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27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
346.	00:23	01:01	18963.	267.75	269.11	331.41	1.0253	0.9816	0.9962	0.9816	0.9962	0.9962	0.9962	1.0399	1.0	2761.0
			18947.	268.55	267.98	331.41	0.9380	1.0690	1.0690	0.9380	0.9671	1.0399	0.9380	0.9962	1.0	2762.0
			18928.	268.32	268.32	331.07	0.9962	0.9671	0.9816	0.9962	1.0399	1.0399	1.0399	1.0399	1.0	2763.0
			18909.	268.32	268.21	331.07	0.9234	1.0690	1.0253	0.9962	0.9816	0.9671	0.9671	0.9671	1.0	2764.0
347.	00:23	01:01	18888.	267.29	266.71	330.73	0.9525	0.9962	1.0836	1.1272	1.1127	1.0981	1.1127	0.9671	1.0	2765.0
			18870.	266.24	266.48	331.07	1.0836	0.9962	1.0836	1.0690	0.9671	1.0544	1.0690	0.9962	1.0	2766.0
			18850.	266.94	266.83	331.07	0.9671	0.9671	0.9671	0.9962	1.0981	1.0981	0.9816	1.0253	1.0	2767.0
			18832.	266.13	266.13	331.41	1.0399	1.0690	0.9962	0.9671	0.9525	0.9380	0.9525	1.0399	1.0	2768.0
348.	00:23	01:01	18805.	266.24	266.24	331.41	0.9671	1.0253	1.0399	1.0399	1.0253	1.0836	0.9962	1.0690	1.0	2769.0
			18787.	266.48	267.41	331.41	0.9816	0.9962	1.0399	0.9671	0.9525	0.9816	0.9962	0.9816	1.0	2770.0
			18762.	267.41	267.18	331.41	1.0690	0.9816	1.0399	1.0399	0.9816	1.0399	1.0253	0.9962	1.0	2771.0
			18742.	267.41	267.06	331.07	1.0399	1.0253	0.9380	0.9816	0.9962	0.9816	0.9671	0.9962	1.0	2772.0
349.	00:23	01:01	18723.	267.75	267.18	331.41	0.9816	0.9525	0.9671	0.9671	0.9962	0.9962	0.9671	1.0690	1.0	2773.0
			18703.	267.75	267.64	331.07	0.9816	0.9671	0.9671	0.9671	0.9962	0.9962	0.9816	0.9525	1.0	2774.0
			18684.	267.75	266.83	331.07	0.9671	0.9816	0.9525	0.9962	1.0544	1.0690	0.9380	0.9525	1.0	2775.0
			18666.	266.83	266.94	331.07	1.0399	0.9525	1.0253	0.9671	0.9671	0.9816	0.9962	1.0253	1.0	2776.0
350.	00:23	01:01	18644.	266.36	265.18	331.07	0.9962	0.9525	0.9816	1.0253	0.9962	0.9671	1.0253	1.0981	1.0	2777.0
			18625.	265.18	265.89	331.07	0.9088	0.9962	1.0544	0.9816	0.9962	1.0399	1.0399	0.9962	1.0	2778.0
			18606.	265.42	264.94	330.39	0.9671	0.9380	0.9962	0.9380	1.0544	1.0399	1.0690	0.9088	1.0	2779.0
			18588.	264.46	264.34	330.73	0.9088	1.0544	0.9962	0.9816	0.9962	1.0544	0.9962	0.9816	1.0	2780.0
351.	00:23	01:01	18568.	264.70	265.54	330.73	0.9671	0.9816	0.9525	0.9816	0.9962	1.0399	1.0399	1.0399	1.0	2781.0
			18547.	265.30	265.65	331.07	0.9671	0.9380	1.0399	0.9962	0.9962	0.9962	0.9816	0.9671	1.0	2782.0
			18524.	264.94	264.10	330.73	0.9671	0.9671	1.0690	0.9088	1.0836	1.0399	1.0690	1.0399	1.0	2783.0
			18504.	263.86	263.98	330.73	0.9962	1.0544	0.9671	0.9671	0.9962	0.9816	0.9962	0.9816	1.0	2784.0
352.	00:23	01:01	18480.	264.22	264.22	330.05	0.9962	0.9671	0.9816	0.9962	0.9816	1.0399	0.9525	0.9962	1.0	2785.0
			18459.	264.34	264.46	330.39	0.9671	0.9816	0.9525	0.9816	0.9671	0.9671	0.9962	0.9671	1.0	2786.0
			18442.	264.22	263.86	330.39	0.9816	1.0399	1.0544	1.0399	0.9962	0.9962	1.0399	0.9962	1.0	2787.0
			18416.	263.98	263.37	329.72	0.9962	0.9962	0.9816	1.0399	1.0981	0.9234	1.0399	1.0399	1.0	2788.0
353.	00:23	01:01	18398.	263.62	263.74	330.39	1.0544	1.0544	0.9962	0.9962	0.9816	0.9671	0.9962	0.9671	1.0	2789.0
			18379.	263.86	263.37	330.05	0.9671	0.9816	0.9816	0.9671	0.9962	0.9816	0.9962	1.0399	1.0	2790.0
			18361.	264.10	264.34	330.39	0.9962	0.9962	0.9671	0.9816	0.9671	1.0399	0.9962	0.9962	1.0	2791.0
			18340.	264.34	264.82	330.39	0.9962	0.9962	0.9816	0.9816	0.9671	0.9816	0.9525	0.9525	1.0	2792.0
354.	00:23	01:01	18326.	266.13	266.71	330.39	0.9671	0.9816	0.9816	0.9962	0.9816	0.9816	0.9962	0.9962	1.0	2793.0
			18303.	266.83	266.94	330.73	0.9816	1.0690	0.9671	0.9962	0.9671	0.9962	0.9671	0.9962	1.0	2794.0
			18289.	266.94	267.18	330.39	1.0399	0.9816	0.9962	1.0253	0.9962	0.9816	0.9671	1.0836	1.0	2795.0
			18272.	267.18	267.06	331.07	0.9380	1.0399	0.9380	0.9671	0.9816	0.9962	1.0544	0.9525	1.0	2796.0
355.	00:23	01:01	18257.	267.52	267.75	331.07	1.0690	1.0544	1.0544	0.9962	0.9962	0.9816	0.9671	0.9962	1.0	2797.0
			18238.	268.09	267.75	331.07	0.9816	0.9816	0.9962	0.9962	0.9671	0.9962	0.9671	0.9962	1.0	2798.0
			18225.	267.64	267.64	330.39	0.9962	1.0253	0.9816	1.0544	0.8652	1.0253	0.9962	0.9962	1.0	2799.0
			18208.	267.06	267.29	330.73	0.9962	0.9671	0.9962	0.9671	0.9962	0.9962	0.9962	0.9380	1.0	2800.0
356.	00:23	01:01	18198.	267.75	268.09	330.39	1.0544	0.9962	0.9671	1.0544	1.0399	1.0544	0.9671	0.9380	1.0	2801.0
			18179.	267.52	267.29	330.73	0.9962	0.9962	1.0690	0.9525	0.9962	0.9088	1.0544	1.0690	1.0	2802.0
			18164.	266.59	266.36	330.39	1.0399	0.9962	1.0253	0.9962	0.9671	0.9671	1.0399	0.9962	1.0	2803.0
			18147.	265.89	265.77	330.73	0.9816	0.9816	1.0399	1.0399	1.0544	1.0690	1.0399	0.9962	1.0	2804.0
357.	00:23	01:01	18133.	265.77	265.42	330.73	1.0690	0.9671	0.9962	1.0836	1.0544	0.9816	1.0690	0.9962	1.0	2805.0
			18115.	266.48	266.59	330.39	1.0544	1.0108	1.0544	1.0399	0.9962	0.9962	0.9962	0.9816	1.0	2806.0
			18104.	265.89	266.24	330.73	0.9671	0.9671	0.9816	0.9962	0.9671	1.0253	0.9671	0.9816	1.0	2807.0
			18093.	266.94	266.94	330.73	0.9962	1.0399	0.9962	0.9962	0.9962	0.9671	0.9962	1.0690	1.0	2808.0
358.	00:23	01:01	18081.	266.83	267.29	330.73	1.0690	0.9671	0.9671	0.9671	0.9962	0.9671	0.9816	0.9962	1.0	2809.0
			18072.	267.06	266.36	330.73	0.9816	0.9380	1.0253	1.0253	0.9962	0.9962	1.0690	1.0836	1.0	2810.0
			18062.	266.83	267.29	330.73	0.9671	0.9962	0.9962	0.9816	0.9962	0.9962	0.9671	0.9816	1.0	2811.0
			18053.	267.75	267.52	330.73	0.9962	0.9816	0.9962	1.0253	0.9962	0.9962	0.9962	0.9671	1.0	2812.0
359.	00:23	01:01	18047.	266.94	267.52	330.39	0.9671	1.0544	0.9962	0.9816	1.0399	1.0399	1.0253	0.9816	1.0	2813.0
			18041.	267.64	267.87	330.73	0.9962	0.9962	1.0690	1.0253	0.9962	0.9380	1.0399	1.0544	1.0	2814.0
			18035.	267.98	266.94	331.07	1.0544	1.0690	0.9962	1.0253	1.0690	1.0399	0.9962	0.9088	1.0	2815.0
			18025.	266.71	265.54	331.07	1.0690	0.9962	0.9816	0.9962	0.9671	0.9671	0.9380	0.9671	1.0	2816.0
360.	00:23	01:01	18018.	265.77	265.77	330.73	0.9234	1.0981	1.0399	0.9962	0.9962	1.0253	0.9962	0.9816	1.0	2817.0
			18011.	266.13	266.24	330.73	1.0690	0.9671	1.0399	0.9962	1.0544	1.0544	0.9816	0.9671	1.0	2818.0
			18004.	265.77	266.13	331.07	0.9962	0.9962	0.9816	0.9962	0.9671	0.9671	0.9962	0.9962	1.0	2819.0
			18000.	265.77	265.30	330.73	0.9962	0.9962	1.0399	0.9962	0.9962	1.0399	1.0399	0.9962	1.0	2820.0

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27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
361.	00:24	01:01	17994.	266.24	266.13	331.07	1.0399	1.0399	0.9962	1.0399	0.9962	0.9962	0.9962	0.9671	1.0	2821.0
			17989.	266.59	266.24	330.73	0.9962	1.0253	0.9380	1.0544	0.9962	1.0399	0.9816	0.9671	1.0	2822.0
			17984.	266.71	266.71	331.07	0.9671	0.9816	0.9671	0.9962	0.9962	0.9088	0.8652	0.8360	1.0	2823.0
			17979.	266.36	266.24	331.41	0.8360	0.8943	0.9816	0.9671	0.9962	0.9234	1.0690	0.9671	1.0	2824.0
362.	00:24	01:01	17973.	267.18	266.48	331.07	0.9671	0.9962	1.0399	0.9671	1.0399	0.9962	1.0836	0.9234	1.0	2825.0
			17968.	266.36	266.24	331.07	1.0253	1.0399	0.9671	0.9671	0.9816	0.9816	1.0399	0.9962	1.0	2826.0
			17962.	265.77	266.48	331.41	0.9816	0.9962	0.9525	0.9671	1.0399	0.8943	0.9234	1.0399	1.0	2827.0
			17955.	265.30	265.65	331.07	1.0399	0.9962	1.0399	0.8943	0.9380	0.8652	0.9088	1.0399	1.0	2828.0
363.	00:24	01:01	17953.	266.01	264.94	331.07	0.9962	0.9671	0.9671	1.0690	0.9525	0.9671	0.9962	0.9671	1.0	2829.0
			17945.	265.89	266.36	331.07	1.0690	1.0253	0.9234	1.0836	1.0399	0.9816	0.9962	0.9962	1.0	2830.0
			17942.	265.65	265.42	331.07	0.9962	0.9962	0.9525	1.0399	0.9671	1.0690	0.9525	1.0836	1.0	2831.0
			17938.	265.89	267.41	331.07	1.0399	0.9962	0.9671	1.0544	0.9962	0.9816	0.9962	1.0399	1.0	2832.0
364.	00:24	01:01	17932.	266.83	267.18	331.07	0.9380	0.9671	0.9525	0.9671	0.9962	0.9671	0.9816	0.9962	1.0	2833.0
			17928.	266.59	266.24	331.07	0.9962	0.9816	0.9962	0.9816	0.9962	0.9816	0.9962	0.9962	1.0	2834.0
			17925.	267.29	266.01	330.73	0.9671	0.9962	0.9671	0.9962	0.9962	0.9671	0.9671	0.9816	1.0	2835.0
			17922.	266.01	266.36	331.07	0.9816	0.9962	0.9380	0.9962	0.9380	0.8943	0.9671	1.0981	1.0	2836.0
365.	00:24	01:01	17917.	265.65	265.39	331.07	1.1418	1.1418	0.9525	1.0399	1.0253	0.9088	0.9088	1.0690	1.0	2837.0
			17915.	265.89	265.18	330.73	1.0690	1.0690	0.9962	0.9671	0.9816	1.0399	0.9380	0.9525	1.0	2838.0
			17912.	264.58	264.10	331.41	1.0399	1.0399	1.0690	0.9816	1.0399	1.0544	0.9671	1.0836	1.0	2839.0
			17908.	264.10	265.77	331.76	0.9088	0.9380	0.9671	0.9816	0.9962	0.9671	0.9816	0.9525	1.0	2840.0
366.	00:24	01:01	17905.	265.42	265.42	332.46	1.0690	0.9525	0.9962	0.9962	1.0544	0.9816	0.9962	1.0399	1.0	2841.0
			17901.	265.18	265.18	333.17	0.9816	0.9962	1.0690	1.0836	1.1272	1.0836	1.1127	0.9671	1.0	2842.0
			17898.	265.42	266.71	334.61	1.0544	1.0836	0.9525	0.9962	0.9962	0.9962	0.9234	0.9962	1.0	2843.0
			17895.	267.98	267.75	335.35	1.0399	0.9962	0.9962	0.9525	1.0836	1.0690	0.9816	0.9962	1.0	2844.0
367.	00:24	01:01	17891.	267.98	267.52	336.84	0.9962	1.0690	1.0544	1.0544	1.0690	1.0690	1.0690	0.9962	1.0	2845.0
			17887.	267.98	267.75	337.99	0.9671	0.9525	0.9234	0.9816	0.9962	1.0836	1.0399	0.9962	1.0	2846.0
			17884.	266.83	266.71	339.15	0.9671	1.0981	0.9962	0.9380	0.9816	0.9525	1.0690	1.0981	1.0	2847.0
			17880.	266.59	266.36	340.73	1.1272	1.0981	1.0981	1.0690	1.0981	1.0981	0.9525	0.9671	1.0	2848.0
368.	00:24	01:01	17876.	267.41	267.06	341.13	0.9671	1.0690	1.1418	1.1855	1.0981	0.9816	0.9088	0.8797	1.0	2849.0
			17873.	267.75	267.18	341.94	0.9816	0.9234	1.0981	1.0836	1.1418	1.1418	1.1272	1.0836	1.0	2850.0
			17499.	266.36	266.71	343.16	1.0544	1.0690	0.9962	1.0399	1.0836	1.0836	1.0690	1.0690	1.0	2851.0
			17488.	266.24	265.06	344.40	1.0690	1.0690	1.0836	1.1272	1.0690	1.0836	1.1418	1.1272	1.0	2852.0
369.	00:24	01:01	17468.	264.34	264.94	345.23	1.0836	1.1127	1.0690	0.9962	0.9962	1.0544	1.0981	1.0836	1.0	2853.0
			17460.	266.94	267.87	346.92	1.0690	0.9671	0.9671	1.0690	1.0981	1.0836	1.0690	1.0981	1.0	2854.0
			17442.	266.94	266.59	347.77	1.1272	1.1272	1.1418	1.0836	1.0399	0.9525	1.0399	0.9962	1.0	2855.0
			17429.	267.29	266.71	348.63	0.9671	0.9671	1.0836	1.1272	1.1272	1.1127	1.1709	1.1418	1.0	2856.0
370.	00:24	01:01	17419.	266.83	267.06	350.36	1.0836	1.0544	0.9671	0.9671	0.9671	1.0690	1.0690	1.0836	1.0	2857.0
			17408.	269.11	269.56	351.67	0.9234	1.1272	0.9234	1.0836	0.9671	0.9525	1.0690	1.0836	1.0	2858.0
			17397.	269.00	269.56	352.54	1.1272	1.1418	1.1709	1.1855	1.0981	1.0399	0.9525	1.0399	1.0	2859.0
			17385.	269.23	269.23	353.43	1.1272	1.1272	1.0836	1.0836	1.0544	0.9671	0.9962	0.9380	1.0	2860.0
371.	00:24	01:01	17379.	267.98	267.64	354.76	0.9962	1.0399	1.0399	0.9962	0.9380	0.9234	1.0836	1.1272	1.0	2861.0
			17367.	268.78	269.00	355.20	1.1855	1.1418	1.1127	1.0544	1.1272	1.0836	1.0690	0.9962	1.0	2862.0
			17359.	269.11	269.00	356.54	0.9380	0.9671	1.0836	1.0981	0.9380	1.1272	1.1272	0.9671	1.0	2863.0
			17352.	267.18	267.64	358.32	0.9380	1.0399	0.9962	1.0544	1.1272	1.0836	1.0544	1.1272	1.0	2864.0
372.	00:24	01:01	17347.	268.55	270.89	359.66	1.0981	1.1127	0.9671	1.0690	0.9816	0.9525	0.9962	0.9962	1.0	2865.0
			17337.	268.89	267.98	1.34	1.0836	1.1272	1.1418	1.1855	1.0690	1.0690	1.1127	1.0981	1.0	2866.0
			17316.	266.71	267.18	2.24	1.0690	0.9671	1.0544	1.0399	1.0253	0.8797	0.9962	1.0836	1.0	2867.0
			17313.	266.13	266.48	3.13	1.1855	1.0981	1.0690	0.9816	0.9962	0.9962	0.9234	0.9962	1.0	2868.0
373.	00:24	01:01	17319.	265.77	264.82	3.58	0.9816	0.9816	1.0544	0.9671	0.9671	1.0690	1.0690	0.9088	1.0	2869.0
			17306.	264.34	264.94	4.47	0.9671	1.0690	1.0836	0.9962	0.9962	0.9671	1.0981	1.1418	1.0	2870.0
			17298.	266.94	266.59	5.36	1.1855	1.1709	1.2146	0.9962	0.9380	0.9525	0.9671	1.0981	1.0	2871.0
			17295.	264.82	266.48	6.24	0.9671	1.0399	1.0399	0.9962	0.9380	1.0981	1.0981	1.0836	1.0	2872.0
374.	00:24	01:01	17284.	264.82	264.34	8.00	1.0981	1.1272	1.0836	1.0690	1.0981	1.0981	1.1418	1.2146	1.0	2873.0
			17268.	263.98	262.27	8.88	1.2146	1.1272	0.9671	0.9816	0.9088	1.0544	0.9671	1.0690	1.0	2874.0
			17271.	262.64	263.01	9.75	1.1418	1.1127	1.0836	0.9234	1.0981	1.0981	0.9962	1.0690	1.0	2875.0
			17269.	263.13	260.51	10.19	0.9234	0.8360	0.8360	0.9962	1.0399	1.2146	1.2874	1.1564	1.0	2876.0
375.	00:24	01:01	17258.	263.25	264.22	10.62	1.0836	0.9671	0.9088	0.8797	0.8943	0.8797	0.8506	0.8797	1.0	2877.0
			17262.	264.82	264.58	11.05	0.9380	0.9088	1.0981	0.9380	0.9380	0.8797	0.8506	0.8797	1.0	2878.0
			17251.	264.22	264.58	12.77	0.9088	0.9088	0.8360	0.8215	0.8215	0.8215	0.8215	0.9816	1.0	2879.0
			17241.	266.71	264.46	13.19	0.9816	0.9234	0.8943	0.7196	0.5885	0.6904	0.8797	0.9816	1.0	2880.0

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27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88 — NTSB DATA DUMP PROGRAM — PAGE 4

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
376.	00:25	01:01	17227.	258.21	251.62	14.46	1.1709	1.1418	1.2437	0.9671	1.1418	1.1418	1.4912	1.6805	1.0	2881.0
			17183.	269.90	268.55	15.29	1.4476	0.9380	0.8506	0.7778	0.7341	0.5303	0.6904	1.1709	1.0	2882.0
			17195.	263.37	264.46	16.53	1.0690	0.5448	0.7632	1.0690	1.1418	1.0981	1.2728	0.9962	1.0	2883.0
			17144.	262.64	257.69	17.76	0.9816	0.8652	0.8797	0.9088	1.1418	0.8506	0.8215	0.8360	1.0	2884.0
377.	00:25	01:01	17134.	269.90	268.66	18.97	0.8943	0.9088	1.0690	0.9671	0.9671	1.0690	1.1127	1.1272	1.0	2885.0
			17079.	266.13	262.88	19.77	1.0836	0.9234	0.7778	0.7050	0.8360	0.8360	1.0399	0.9234	1.0	2886.0
			17052.	263.25	264.70	19.77	0.9962	0.9962	0.9088	0.9088	0.9962	0.9234	0.9234	0.9380	1.0	2887.0
			17034.	261.77	260.89	19.77	0.8943	0.8943	0.8360	0.8797	0.8360	0.8652	0.8797	1.0399	1.0	2888.0
378.	00:25	01:01	17006.	259.62	258.21	19.77	1.0399	0.8943	0.8652	0.8506	0.8069	0.7487	0.7632	0.7196	1.0	2889.0
			16985.	255.44	255.57	19.77	0.7924	0.8652	0.8652	0.8506	0.8652	0.8797	1.0981	1.0544	1.0	2890.0
			16943.	253.14	246.96	20.16	1.1272	1.1418	1.4621	1.5349	1.4476	1.3602	1.0690	0.3701	1.0	2891.0
			16915.	247.25	251.21	20.95	0.1080	0.4720	1.1418	0.8506	0.5012	0.6468	0.9234	1.0253	1.0	2892.0
379.	00:25	01:01	~~15000.~~	260.51	262.02	21.72	1.1855	1.3602	1.2728	0.9671	0.9671	1.2874	1.3020	1.3893	1.0	2893.0
			16819.	267.18	261.40	23.25	1.0836	0.3556	1.0981	1.2437	1.2728	0.9962	0.9380	0.9671	1.0	2894.0
			16777.	262.51	262.88	23.63	0.8360	0.7050	0.6613	0.6176	0.7632	0.9234	0.9671	1.3020	1.0	2895.0
			16747.	272.08	283.25	22.87	0.9088	0.6613	0.2100	0.2973	0.7196	0.7778	0.8360	1.0981	1.0	2896.0
380.	00:25	01:01	16711.	280.04	285.59	20.56	1.2146	1.4039	1.4039	0.6176	1.0690	0.9380	0.9816	1.7388	1.0	2897.0
			16669.	290.15	286.79	18.17	2.0300	1.5204	1.1418	0.4720	0.5448	0.4575	0.7050	0.7341	1.0	2898.0
			16664.	282.02	288.76	16.12	0.5303	1.5204	1.2146	1.2583	0.9088	1.5058	1.5349	1.9572	1.0	2899.0
			16603.	289.49	283.16	16.53	2.1319	2.2920	0.9088	1.0690	0.5012	0.6176	0.7341	1.3602	1.0	2900.0
381.	00:25	01:01	16579.	292.27	294.50	15.71	1.2000	1.8989	1.9280	0.6031	0.0498	0.1517	1.1709	1.6077	1.0	2901.0
			16561.	~~314.99~~	298.20	14.88	1.5932	2.6269	2.9327	1.7970	2.0736	1.7679	1.0981	1.0399	1.0	2902.0
			16512.	299.79	293.06	14.88	0.8506	0.5157	0.7341	1.0981	1.0690	0.9088	1.3311	1.4330	1.0	2903.0
			16457.	298.69	291.24	18.57	1.4912	0.8069	-0.0667	-0.4744	-0.3142	0.6759	1.2000	1.7533	1.0	2904.0
382.	00:25	01:01	16543.	301.02	296.46	13.61	2.1173	2.1901	2.3066	1.6660	0.8069	0.6031	0.4284	0.2973	1.0	2905.0
			15561.	291.49	291.84	15.71	0.6904	0.9671	1.0690	1.3602	1.0981	0.9816	0.5594	0.6322	1.0	2906.0
			16560.	287.81	285.34	15.71	0.4866	0.3992	0.2682	0.3119	0.3119	0.3556	0.3701	0.4284	1.0	2907.0
			16551.	288.20	284.27	15.29	0.6613	0.5885	0.9962	1.2000	1.0836	0.7924	0.7778	0.5740	1.0	2908.0
383.	00:25	01:01	16535.	286.79	290.82	14.04	0.6031	0.4866	0.7632	0.7632	0.7341	0.7924	0.8360	0.7778	1.0	2909.0
			16543.	290.73	295.79	14.04	0.8215	0.8652	0.8797	1.0836	1.2000	1.1855	0.9380	0.8797	1.0	2910.0
			16512.	295.42	300.71	14.46	0.8797	0.2682	0.5594	0.8943	1.2292	1.0981	1.1855	1.4621	1.0	2911.0
			16519.	305.55	303.03	15.29	1.6951	1.8116	1.7388	1.4184	1.4476	1.6077	1.3456	1.0690	1.0	2912.0
384.	00:25	00:01	16491.	300.00	299.90	16.95	1.0544	0.6322	0.7632	0.3701	0.3992	1.3893	1.4621	0.0644	1.0	2913.0
			16491.	298.99	~~100.00~~	18.57	2.5396	0.7778	0.7924	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	2914.0
			~~17501.~~	~~438.10~~	~~425.79~~	104.46	1.1418	1.2000	1.0981	1.3311	1.1855	1.4330	1.2874	0.9962	0.0	3.0
			~~10125.~~	242.28	244.49	104.04	1.1127	1.0690	1.1709	1.4621	1.3456	1.2146	1.0836	0.9816	0.0	4.0
385.	00:25	00:00	12992.	251.21	247.39	104.88	0.9234	0.8797	0.7196	0.7632	0.5740	0.8652	0.8652	0.8069	0.0	5.0
			12969.	253.41	256.77	109.37	0.8943	1.1418	1.2583	1.1709	1.2000	1.3456	1.3311	1.3456	0.0	6.0
			12949.	258.60	259.50	108.17	1.3020	1.1855	1.3311	1.3456	1.2728	1.2874	1.2000	1.2292	0.0	7.0
			12938.	262.51	260.39	109.37	1.2000	1.0690	1.0690	1.1709	1.1855	1.1709	1.1418	1.2292	0.0	8.0
386.	00:25	00:00	12925.	258.21	260.39	112.87	1.2146	1.2437	1.1418	1.0981	1.0690	1.1418	1.2728	1.2874	0.0	9.0
			12918.	256.24	252.73	112.87	1.1418	1.0836	1.3456	1.4039	1.2874	1.2292	1.1418	1.1272	0.0	10.0
			12913.	256.64	255.57	110.95	1.0690	1.0399	1.1272	1.2874	1.2874	1.0544	0.6759	0.6759	0.0	11.0
			12913.	252.45	256.11	110.95	0.6904	0.6176	0.7778	0.6759	1.0690	0.9962	1.1272	1.0690	0.0	12.0
387.	00:25	00:00	12903.	259.50	263.74	112.49	0.9962	0.9234	0.6176	0.5157	0.8069	0.9234	0.8943	0.8652	0.0	13.0
			12900.	265.30	262.39	112.11	1.2000	1.4767	1.4621	1.4476	1.2874	1.1272	1.0690	1.0690	0.0	14.0
			12895.	261.65	259.75	110.16	0.8360	0.7196	0.8215	0.4284	0.2828	0.5594	0.7487	0.8652	0.0	15.0
			12897.	254.09	255.84	110.56	1.0836	1.2000	1.2000	1.3020	1.2583	1.1272	1.0690	1.0836	0.0	16.0
388.	00:25	00:00	12884.	262.51	256.11	112.87	0.8943	0.7778	0.8069	0.6613	0.5157	0.6613	0.8652	1.0544	0.0	17.0
			12884.	258.08	255.97	112.49	0.9816	0.8943	0.9962	0.9816	1.0981	1.1418	1.1418	1.2728	0.0	18.0
			12874.	255.71	254.36	115.11	1.2728	1.1709	0.8069	0.6759	0.6759	0.7487	1.0544	1.1127	0.0	19.0
			12498.	258.60	255.71	115.84	1.1127	1.0690	0.8652	0.8069	0.8506	0.8360	1.0690	0.9962	0.0	20.0
389.	00:25	00:00	12476.	254.90	256.50	115.84	0.9962	1.0836	1.1855	1.2583	1.2000	1.2292	0.9234	0.8506	0.0	21.0
			12435.	253.82	253.28	117.63	1.0690	0.7341	0.7341	0.7341	1.0690	0.9816	0.9234	0.9816	0.0	22.0
			12400.	247.10	249.67	118.33	1.1127	0.9816	1.0690	0.8506	0.8943	1.0981	1.1272	1.0399	0.0	23.0
			12374.	249.24	247.96	117.98	1.1272	1.1272	0.9962	0.9380	1.0399	1.0399	1.0690	1.1709	0.0	24.0
390.	00:25	00:00	12340.	247.25	244.05	118.67	1.2437	0.8797	0.8943	1.1272	1.2292	1.1418	0.9816	0.9962	0.0	25.0
			12317.	240.05	241.69	119.02	0.9671	0.8069	0.8215	0.8360	0.8215	0.8797	1.0399	1.1127	0.0	26.0
			12288.	239.90	237.33	119.36	1.4330	1.5204	1.2000	0.9962	0.8215	0.7487	0.7632	0.7632	0.0	27.0
			12265.	240.35	239.45	120.37	0.7487	0.9234	0.9671	1.0981	1.1418	1.3020	1.0690	1.2146	0.0	28.0

POWER INTERRUPT

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27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S	FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
	391.	00:26	00:00	12221.	242.58	245.95	120.37	0.9816	1.0399	0.9671	0.9816	0.7778	0.7778	0.7778	0.5885	0.0	29.0
				12203.	245.37	245.66	119.36	0.8215	0.9380	1.0690	1.0981	1.1418	1.1127	0.9380	0.9671	0.0	30.0
				12163.	245.95	241.24	121.03	0.9380	0.8360	0.8215	0.6613	0.7632	0.7050	0.7778	0.9234	0.0	31.0
				12132.	240.65	239.90	122.01	0.9962	1.1709	1.1564	1.1272	1.1855	1.1709	1.1272	1.0836	0.0	32.0
	392.	00:26	00:00	12095.	240.20	239.60	122.33	1.0399	0.9380	0.7632	0.7924	1.1127	1.2292	1.1272	0.9816	0.0	33.0
				12060.	240.80	243.02	122.64	0.9671	1.0399	0.9380	1.0399	1.0544	1.0399	0.9088	0.8360	0.0	34.0
				12022.	242.43	242.28	123.59	0.8506	0.8215	0.8215	0.8506	1.0399	0.9962	0.9234	0.8506	0.0	35.0
				11986.	239.75	243.02	125.11	0.8943	0.9380	1.0399	0.9816	1.3748	1.3456	1.2874	1.2874	0.0	36.0
	393.	00:26	00:00	11940.	238.24	239.45	125.11	1.2728	1.0544	0.8943	0.8506	0.6322	0.6322	0.7196	0.7196	0.0	37.0
				11923.	239.45	238.69	126.58	0.9962	0.9671	0.8943	0.9380	0.9962	1.0690	1.0544	1.1272	0.0	38.0
				11862.	240.50	241.39	129.36	1.1127	1.1418	1.1418	1.1418	1.1272	1.0690	1.0399	1.1127	0.0	39.0
				11833.	239.45	242.43	129.36	1.1418	1.1564	1.2000	1.1709	1.1418	1.0981	0.9816	0.9380	0.0	40.0
	394.	00:26	00:00	11792.	246.82	245.51	130.93	0.9962	1.1127	1.1709	1.1709	0.9671	1.0399	0.9962	1.0690	0.0	41.0
				11760.	245.66	243.02	132.43	0.7924	0.7487	0.8069	0.8652	1.0544	1.1272	1.2000	1.0399	0.0	42.0
				11720.	248.25	245.66	133.39	1.1127	1.2292	1.1709	1.1418	1.0399	0.9962	0.9816	1.0836	0.0	43.0
				11685.	245.08	243.47	134.55	1.2000	1.2146	1.0981	1.0981	1.1272	1.1272	1.0544	1.0544	0.0	44.0
	395.	00:26	00:00	11652.	241.99	238.69	134.09	1.0690	0.9962	1.0690	0.9816	1.0690	1.1272	1.1709	1.2000	0.0	45.0
				11617.	239.30	241.09	132.91	1.2292	1.1709	1.1127	1.0544	0.8652	0.8215	0.8652	0.8360	0.0	46.0
				11590.	240.50	239.30	132.43	0.9088	0.9671	1.0544	0.9816	0.9816	0.9671	0.9816	1.0108	0.0	47.0
				11572.	238.69	238.39	130.16	1.1272	1.1709	1.1418	1.0981	1.0981	1.0544	0.9380	1.0544	0.0	48.0
	396.	00:26	00:00	11547.	237.48	233.97	130.42	1.0544	0.9962	0.8652	1.0399	0.9234	0.9234	0.9962	0.9234	0.0	49.0
				11514.	233.05	234.89	130.67	0.8797	0.8069	1.0544	1.0690	1.0836	0.9671	1.0544	0.8360	0.0	50.0
				11496.	233.82	234.89	129.09	0.8215	0.8797	0.9234	0.9962	0.9816	0.9962	0.9962	1.0399	0.0	51.0
				11467.	236.88	236.57	129.09	0.9088	1.0690	0.9962	1.0399	0.9816	0.9816	0.9671	1.0399	0.0	52.0
	397.	00:26	00:00	11437.	236.42	235.96	128.55	0.8215	0.8360	0.8652	0.9088	0.8943	1.0399	0.9380	0.9088	0.0	53.0
				11413.	235.20	233.05	127.16	1.0544	1.0690	1.0836	1.1127	0.9962	0.8215	0.7341	0.7632	0.0	54.0
				11380.	233.82	233.51	127.16	0.7487	0.7487	0.8943	0.9234	1.0399	1.0544	1.0690	1.0399	0.0	55.0
				11340.	232.44	233.97	126.87	0.9671	1.0690	0.8797	0.8797	0.8215	0.8360	0.8797	0.8943	0.0	56.0
	398.	00:26	00:00	11308.	232.44	231.36	126.58	0.8943	0.9380	0.9088	0.9380	1.0544	0.9962	1.0544	1.0981	0.0	57.0
				11266.	231.82	231.36	126.00	1.0981	1.1564	1.1855	1.1709	1.1418	1.1855	1.1418	1.1418	0.0	58.0
				11232.	232.28	231.51	124.81	1.2437	1.2874	1.1855	1.0981	1.0981	1.0399	0.9962	0.8943	0.0	59.0
				11194.	230.74	233.82	124.51	0.9088	1.1564	1.1418	0.8652	0.7341	0.9088	0.8506	0.8943	0.0	60.0
	399.	00:26	00:00	11167.	232.28	232.13	124.20	0.9671	1.0690	1.0690	1.0981	1.1127	1.0981	1.2000	1.2146	0.0	61.0
				11130.	234.59	233.51	123.27	1.0690	0.9088	0.9962	0.9962	0.9962	1.0981	1.0836	1.0690	0.0	62.0
				11101.	232.59	230.12	122.01	1.0836	1.0690	0.9380	0.8797	1.0690	0.9380	0.9234	0.9816	0.0	63.0
				11073.	229.35	228.73	122.96	1.0399	0.9962	0.9962	0.9671	0.9962	0.9962	0.9671	0.9962	0.0	64.0
	400.	00:26	00:00	11042.	226.71	225.62	122.96	0.9380	0.9234	0.9234	0.7487	0.7341	0.8360	1.0544	0.9962	0.0	65.0
				11022.	222.20	224.69	122.01	1.0690	1.0836	0.9962	0.9962	0.8360	0.6904	0.7196	0.7487	0.0	66.0
				10994.	225.15	224.07	122.96	0.8069	0.8360	0.8943	1.0399	0.9962	1.0981	1.2292	1.2437	0.0	67.0
				10953.	224.07	226.55	123.27	1.2292	1.1127	1.0981	1.0399	0.8797	0.8652	0.8360	0.8215	0.0	68.0
	401.	00:26	00:00	10916.	227.64	225.78	122.01	0.8797	0.9088	0.8797	0.8652	0.8215	0.8943	1.0690	0.9380	0.0	69.0
				10890.	227.95	227.64	119.36	0.9816	1.0690	0.9816	1.0690	0.8360	0.8943	1.0690	0.9962	0.0	70.0
				10858.	228.88	229.04	119.70	1.0399	0.9088	1.0399	1.0399	0.9380	0.9962	1.0399	0.9234	0.0	71.0
				10814.	228.11	226.71	121.36	0.8360	0.8360	0.8069	0.7632	0.8360	0.8652	0.8506	0.8797	0.0	72.0
	402.	00:26	00:00	10769.	227.95	226.09	121.03	0.8360	0.8069	1.0399	1.0544	0.9671	1.0690	1.0690	0.8943	0.0	73.0
				10732.	224.84	223.29	118.33	1.0399	1.2146	1.4184	1.1855	1.0981	1.0544	0.8797	0.9380	0.0	74.0
				10683.	226.86	228.26	116.57	1.0690	1.0690	0.9962	1.1272	1.1272	1.2437	1.2874	1.1418	0.0	75.0
				10634.	226.40	225.00	113.63	1.2146	1.2000	1.0690	1.0690	1.0836	1.0690	1.0399	0.9671	0.0	76.0
*	403.	00:26	:	~~588.~~	225.00	~~119.49~~	110.56	1.0544	0.9962	~~7.5191~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~7.5191~~	~~1.0690~~	~~3072.0~~	~~0.0~~
*				~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
*				~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
*				~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
	404.	00:26	00:00	10381.	225.93	227.02	101.48	1.1855	1.1272	1.1418	1.2292	1.2000	1.1272	1.1127	1.0981	0.0	81.0
				10323.	224.22	224.22	99.32	1.1272	1.0836	1.1127	1.1272	1.1855	1.1709	1.2000	1.2292	0.0	82.0
				10270.	226.24	225.15	97.13	1.1564	1.1127	1.1127	1.1127	1.1418	1.1418	1.0399	0.8215	0.0	83.0
				10212.	231.82	230.43	94.02	1.0690	1.1272	1.2000	1.2292	1.1127	1.1272	1.1418	1.1855	0.0	84.0
	405.	00:26	00:00	10161.	231.97	228.26	91.79	1.2292	1.2728	1.2583	1.1855	1.2000	1.2437	1.2874	1.2292	0.0	85.0
				10096.	228.42	227.33	91.34	1.2437	1.3456	1.2292	1.0981	1.1272	1.1272	1.1564	1.1709	0.0	86.0
				10045.	228.73	233.05	87.87	1.1272	1.0836	1.0544	1.0690	1.0544	0.9816	0.9962	1.0690	0.0	87.0
				9997.	234.13	236.57	84.76	1.0690	1.0544	0.9380	1.1272	1.1272	1.1709	1.2000	1.2000	0.0	88.0

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TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
406.	00:27	00:00	9942.	237.48	237.64	82.11	1.2000	1.2000	1.2000	1.1855	1.1709	1.1564	1.1564	1.1418	0.0	89.0
			9890.	238.54	239.45	80.36	1.1855	1.1564	1.1272	1.2292	1.3020	1.3020	1.3456	1.3456	0.0	90.0
			9840.	240.35	240.95	78.20	1.3456	1.2874	1.2583	1.2728	1.2728	1.2583	1.2874	1.2874	0.0	91.0
			9796.	240.80	241.09	76.49	1.3020	1.2874	1.2728	1.2292	1.2292	1.2000	1.1855	1.1855	0.0	92.0
407.	00:27	00:00	9756.	241.84	241.99	75.23	1.1418	1.1564	1.1418	1.1564	1.1855	1.1855	1.2000	1.1855	0.0	93.0
			9724.	242.43	242.73	73.16	1.1709	1.1418	1.1418	1.1418	1.1418	1.1709	1.1418	1.1418	0.0	94.0
			9690.	242.58	242.58	71.94	1.1418	1.1564	1.1855	1.1564	1.1709	1.1709	1.1709	1.1709	0.0	95.0
			9654.	242.43	241.84	70.73	1.1709	1.1709	1.1418	1.1418	1.1418	1.1418	1.1272	1.1418	0.0	96.0
408.	00:27	00:00	9631.	241.54	240.95	69.94	1.1418	1.1127	1.0836	1.0690	1.0399	1.0544	0.9671	1.0544	0.0	97.0
			9607.	240.80	240.65	69.15	1.0399	1.0836	1.0544	1.0544	1.0399	1.0690	1.0690	1.1127	0.0	98.0
			9583.	240.50	239.60	68.37	1.1418	1.1855	1.2292	1.2292	1.2437	1.2437	1.2292	1.2292	0.0	99.0
			9563.	238.39	238.24	67.22	1.2292	1.2292	1.2000	1.1418	1.1855	1.1564	1.1418	1.1418	0.0	100.0
409.	00:27	00:00	9547.	237.33	236.57	66.09	1.1418	1.1418	1.1272	1.1272	1.1127	1.1272	1.1272	1.0836	0.0	101.0
			9538.	236.27	235.05	65.35	1.0981	1.0836	1.0399	0.9671	0.9962	0.9816	0.9816	1.0399	0.0	102.0
			9537.	234.74	234.89	64.61	0.9671	0.9816	0.9671	0.9962	0.9671	0.9816	0.9671	0.9671	0.0	103.0
			9534.	234.13	234.43	63.52	1.0544	1.0690	0.9671	0.9962	1.0399	0.9380	0.9380	0.9380	0.0	104.0
410.	00:27	00:00	9531.	234.59	234.59	63.17	0.8943	0.8797	0.8797	0.8652	0.8943	0.9088	0.9088	1.0399	0.0	105.0
			9526.	234.74	234.28	62.81	1.0399	1.0544	0.9962	0.9962	0.9962	0.9380	0.9088	0.8652	0.0	106.0
			9515.	232.90	232.75	61.76	0.8797	0.9088	0.9234	0.9962	0.9671	1.0253	1.0690	1.0981	0.0	107.0
			9506.	232.28	231.51	60.39	1.0981	1.1127	1.1272	1.1272	1.1418	1.1272	1.1272	1.1127	0.0	108.0
411.	00:27	00:00	9494.	231.97	231.97	58.72	1.0690	0.9234	1.0836	1.0836	1.0690	1.0690	1.0690	1.0690	0.0	109.0
			9488.	232.44	231.20	57.12	1.0981	1.0836	1.0836	1.0836	1.0836	1.0981	1.0690	1.0690	0.0	110.0
			9484.	231.36	230.12	55.87	1.0544	1.0836	1.0981	1.0836	1.0836	1.0836	1.0690	1.0690	0.0	111.0
			9474.	230.12	229.35	54.66	1.0544	0.9671	1.0399	0.9962	0.9816	1.0253	0.9962	0.9816	0.0	112.0
412.	00:27	00:00	9471.	228.57	228.42	52.92	0.9962	0.9816	0.9671	1.0544	1.0690	1.0690	1.0981	1.0981	0.0	113.0
			9460.	228.42	228.11	51.79	1.0836	1.0544	0.9671	0.9816	0.9962	0.9962	0.9816	0.9816	0.0	114.0
			9452.	227.95	228.11	50.17	0.9962	1.0399	0.9671	0.9962	0.9816	0.9962	0.9816	0.9962	0.0	115.0
			9444.	227.64	227.33	48.37	0.9962	0.9962	1.0544	0.9234	0.9234	0.9234	0.9234	0.8943	0.0	116.0
413.	00:27	00:00	9437.	226.86	226.71	47.39	0.8943	0.8943	0.9234	0.9380	0.9525	0.9380	0.9380	1.0399	0.0	117.0
			9423.	226.24	226.86	46.67	0.9962	0.9816	0.9671	1.0690	1.0836	1.0981	1.0981	1.1418	0.0	118.0
			9404.	227.02	225.93	45.28	1.0981	1.1127	1.1127	0.9088	1.0836	1.0836	1.0836	1.0399	0.0	119.0
			9391.	226.71	225.78	43.63	0.9671	1.0544	1.0399	1.0399	0.9671	0.9962	0.9962	0.9962	0.0	120.0
414.	00:27	00:00	9375.	224.07	223.60	42.18	0.9962	0.9962	0.9962	0.9671	1.0544	1.0399	1.0544	1.0544	0.0	121.0
			9359.	224.22	224.84	41.44	1.0399	0.9816	0.9671	0.9671	0.9816	0.9962	0.9962	0.9962	0.0	122.0
			9345.	225.00	224.84	40.16	0.9962	1.0544	0.9816	0.9816	1.0544	1.0544	1.0690	1.0690	0.0	123.0
			9328.	224.53	223.44	38.28	1.0690	1.0690	1.0544	0.9671	1.0544	0.9671	0.9816	0.9962	0.0	124.0
415.	00:27	00:00	9311.	222.98	222.51	37.44	0.9671	0.9962	0.9816	1.0836	1.0544	1.0544	1.0690	1.0981	0.0	125.0
			9290.	222.51	222.51	34.81	1.0836	1.1127	1.1272	1.0981	1.0981	1.0836	1.0836	1.0544	0.0	126.0
			9275.	221.74	222.51	32.64	1.0544	1.0399	0.9671	1.0399	1.0981	1.0544	0.9816	1.0690	0.0	127.0
			9256.	221.89	222.51	29.70	1.0690	1.0690	1.0981	1.0690	1.0544	0.9234	1.0690	1.0690	0.0	128.0
416.	00:27	00:00	9231.	222.36	222.05	27.98	1.0690	1.0690	1.0690	1.0544	1.0544	1.0690	1.0690	1.0690	0.0	129.0
			9208.	222.36	222.67	26.57	1.0690	1.0690	0.9671	1.0690	1.0981	1.0690	1.0981	1.0981	0.0	130.0
			9182.	223.29	223.13	24.00	1.0981	1.0981	1.1127	1.1127	1.1418	1.1272	1.1272	1.1127	0.0	131.0
			9155.	223.13	223.91	21.72	1.0981	1.0981	1.1418	1.1709	1.1709	1.1709	1.1855	1.1564	0.0	132.0
417.	00:27	00:00	9126.	223.91	223.60	19.37	1.1709	1.1855	1.1855	1.1855	1.1855	1.2000	1.1709	1.1418	0.0	133.0
			9104.	222.67	222.98	17.35	1.1418	1.1272	1.0836	1.0690	1.0544	1.0544	1.0836	1.0836	0.0	134.0
			9079.	223.91	224.53	15.71	1.0690	1.0981	1.0836	1.0836	1.0981	1.1272	1.0981	1.1127	0.0	135.0
			9051.	225.00	224.84	13.61	1.1418	1.1418	1.1418	1.1564	1.1272	1.1418	1.1418	1.1127	0.0	136.0
418.	00:27	00:00	9027.	225.00	225.00	11.48	1.0981	1.0836	1.0690	1.0544	0.9671	0.9671	1.0544	0.9671	0.0	137.0
			9002.	225.00	224.53	9.32	1.0544	1.0690	1.0690	1.0690	1.0981	1.1127	1.1127	1.1272	0.0	138.0
			8979.	224.69	224.22	8.00	1.1418	1.1272	1.0981	1.0981	1.0690	1.0981	1.0836	1.0836	0.0	139.0
			8955.	224.22	224.22	6.24	1.0836	1.0836	1.0690	1.0690	1.0690	1.0836	1.0690	1.0981	0.0	140.0
419.	00:27	00:00	8931.	223.60	224.53	4.91	1.1127	1.1127	1.0981	1.0836	1.0836	1.0690	1.0544	1.0690	0.0	141.0
			8910.	223.60	223.76	4.02	0.9671	1.0690	1.0981	1.0836	1.0690	1.0836	1.0690	1.0836	0.0	142.0
			8889.	224.69	224.53	2.24	1.0690	1.0690	0.9671	0.9671	1.0690	1.0544	1.0399	0.9671	0.0	143.0
			8864.	223.76	222.82	0.90	1.0544	1.0690	0.9671	1.0399	1.0981	1.0981	1.0981	1.0836	0.0	144.0
420.	00:27	00:00	8845.	222.36	222.36	359.22	1.0690	1.0981	1.0690	1.0399	1.0690	1.0690	0.9671	1.0399	0.0	145.0
			8825.	221.89	222.98	357.43	0.9525	0.9671	1.0690	1.0836	0.9671	1.0399	1.0690	1.0981	0.0	146.0
			8805.	223.13	222.82	356.09	1.1127	1.0690	1.0544	0.9671	1.0399	0.9671	0.9671	0.9671	0.0	147.0
			8782.	222.05	222.20	354.31	1.0399	1.0690	1.0690	1.0690	1.0690	1.0690	1.0690	1.0836	0.0	148.0

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TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
421.	00:28	00:00	8760.	222.05	221.89	352.99	1.0836	1.1127	1.0690	0.9671	1.0836	0.9671	0.9962	1.0544	0.0	149.0
			8739.	221.27	220.96	351.67	0.9525	0.9671	1.0690	1.0690	1.0399	1.0399	0.9962	0.9962	0.0	150.0
			8715.	220.65	221.12	349.92	1.0544	1.0690	1.0544	1.0399	1.0399	1.0544	0.9816	0.9962	0.0	151.0
			8689.	221.74	222.05	348.63	1.0690	1.0399	0.9816	1.0399	0.9671	1.0399	1.0690	1.0836	0.0	152.0
422.	00:28	00:00	8670.	220.96	221.12	346.92	1.0690	1.0690	1.0544	1.0544	1.0544	1.0690	1.0399	1.0544	0.0	153.0
			8646.	221.43	220.96	345.23	1.0690	1.0836	1.0690	1.0690	1.0981	1.0836	1.0981	1.0836	0.0	154.0
			8620.	220.81	221.43	343.98	1.1127	1.0836	1.0836	1.0544	1.0690	0.9671	1.0399	1.1127	0.0	155.0
			8597.	220.34	220.19	343.16	1.0981	1.0690	1.0836	1.0690	1.0399	0.9671	0.9671	1.0690	0.0	156.0
423.	00:28	00:00	8578.	220.65	220.19	342.34	1.0690	1.0690	1.0399	1.0399	1.0981	1.0981	1.0690	1.0836	0.0	157.0
			8556.	220.81	221.12	341.94	1.0690	0.9671	1.0690	1.0399	1.0544	0.9671	1.0544	1.0544	0.0	158.0
			8540.	220.96	220.34	340.73	1.0544	0.9671	1.0399	1.0836	1.0690	1.0399	1.0544	1.0544	0.0	159.0
			8523.	219.72	219.88	340.33	1.0544	1.0690	0.9671	1.0690	0.9671	0.9671	0.9671	1.0399	0.0	160.0
424.	00:28	00:00	8506.	219.10	218.95	339.94	1.0399	0.9962	0.9816	0.9671	0.9816	1.0253	1.0544	0.9671	0.0	161.0
			8492.	218.79	160.83	338.76	1.0544	1.0544	0.9671	4.7090	4.7381	4.7527	-2.7020	0.9671	0.0	162.0
			8476.	218.33	218.49	338.37	1.0399	1.0544	1.0690	1.0399	0.9816	0.9816	0.9816	0.9962	0.0	163.0
			8464.	218.02	216.94	337.99	0.9962	0.9962	0.9816	0.9816	1.0399	1.0690	0.9962	0.9962	0.0	164.0
425.	00:28	00:00	8450.	216.64	215.87	337.22	0.9962	0.9962	0.9816	0.9962	0.9816	0.9962	0.9962	0.9962	0.0	165.0
			8438.	215.87	215.72	336.46	1.0399	0.9816	0.9962	0.9962	0.9962	0.9962	1.0399	1.0399	0.0	166.0
			8427.	215.10	214.19	335.72	0.9962	0.9525	0.9525	1.0399	1.0399	0.9962	0.9962	0.9962	0.0	167.0
			8411.	214.34	213.88	335.35	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	168.0
426.	00:28	00:00	8398.	213.42	213.27	334.98	0.9816	0.9816	0.9962	0.9962	0.9816	0.9962	0.9671	1.0544	0.0	169.0
			8386.	212.51	213.12	334.61	1.0690	1.0690	0.9962	0.9671	1.0544	0.9671	0.9671	0.9816	0.0	170.0
			8368.	213.58	212.51	334.61	0.9816	0.9962	0.9816	0.9816	0.9962	1.0399	1.0690	1.0399	0.0	171.0
			8356.	211.76	211.30	333.88	0.9816	0.9962	0.9816	0.9962	0.9962	0.9816	0.9671	1.0399	0.0	172.0
427.	00:28	00:00	8344.	210.55	210.70	333.88	1.0399	1.0544	0.9671	1.0399	1.0690	1.0399	0.9962	1.0690	0.0	173.0
			8337.	210.85	211.15	333.88	1.0690	0.9962	0.9525	0.9671	0.9816	0.9962	0.9816	0.9671	0.0	174.0
			8326.	209.20	209.35	334.25	0.9962	0.9962	0.9962	0.9671	0.9816	0.9816	0.9816	0.9962	0.0	175.0
			8318.	209.05	208.31	333.88	0.9816	0.9671	0.9962	0.9962	0.9962	1.0399	1.0399	1.0544	0.0	176.0
428.	00:28	00:00	8312.	208.46	207.56	334.25	0.9380	0.9962	0.9671	0.9234	0.9234	0.9088	0.8943	0.9234	0.0	177.0
			8296.	207.42	207.71	334.61	0.9088	0.9234	0.9234	0.9234	0.9380	0.9234	0.8943	0.9088	0.0	178.0
			8290.	207.42	207.27	334.61	0.9380	0.9234	0.9234	1.0690	0.9380	0.9380	0.9380	1.0544	0.0	179.0
			8276.	207.56	206.97	334.61	0.9234	0.8943	1.0690	0.9088	0.9234	0.9380	0.9234	0.9088	0.0	180.0
429.	00:28	00:00	8263.	207.12	207.71	334.25	0.8943	0.8943	0.9234	0.9380	1.0399	0.9380	1.0399	1.0544	0.0	181.0
			8246.	206.83	206.68	334.25	1.0544	1.0399	1.0399	0.9962	0.9962	0.9380	0.9962	0.9816	0.0	182.0
			8227.	206.83	206.24	334.25	0.9816	0.9816	0.9962	0.9962	0.9671	0.9816	0.9671	0.9816	0.0	183.0
			8212.	205.94	206.24	333.88	0.9962	0.9962	0.9962	0.9962	0.9380	0.9671	1.0399	0.9962	0.0	184.0
430.	00:28	00:00	8196.	205.80	206.53	334.25	0.9962	0.9962	0.9962	0.9962	0.9816	0.9816	0.9816	0.9816	0.0	185.0
			8176.	207.71	207.27	334.25	0.9671	0.9962	1.0399	1.0544	0.9671	0.9962	0.9671	0.9816	0.0	186.0
			8159.	207.12	207.27	333.88	0.9962	0.9671	0.9816	0.9962	0.9525	0.9380	1.0690	0.9380	0.0	187.0
			8143.	206.53	205.80	333.17	0.9380	0.9234	0.9234	0.9234	1.0544	1.0399	1.0399	0.9962	0.0	188.0
431.	00:28	00:00	8127.	206.09	206.53	333.88	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9816	0.0	189.0
			8108.	206.38	206.24	333.52	0.9962	0.9962	0.9962	0.9816	0.9962	0.9816	0.9816	0.9962	0.0	190.0
			8094.	206.38	206.97	332.81	1.0399	0.9962	1.0399	0.9962	1.0399	0.9962	0.9962	0.9962	0.0	191.0
			8076.	207.12	206.97	333.17	0.9962	0.9816	0.9671	0.9816	0.9962	0.9962	1.0399	0.9962	0.0	192.0
432.	00:28	00:00	8065.	206.53	206.68	332.46	0.9962	0.9962	1.0399	0.9380	0.9671	0.9671	0.9962	1.0399	0.0	193.0
			8049.	206.53	206.09	331.76	1.0690	0.9380	0.9380	1.0690	0.9234	0.8943	0.9088	0.9234	0.0	194.0
			8036.	206.68	206.38	331.76	0.9380	0.9380	1.0690	0.9380	0.9234	0.9088	0.8943	0.9088	0.0	195.0
			8023.	206.09	207.12	331.41	0.9380	1.0399	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	196.0
433.	00:28	00:00	8010.	207.27	207.27	331.07	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	197.0
			7998.	207.56	207.56	330.73	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	198.0
			7987.	207.56	209.05	330.73	0.9962	0.9962	0.9380	0.9962	0.9962	0.9962	0.9962	0.9816	0.0	199.0
			7977.	208.75	208.60	330.39	0.9962	0.9962	0.9962	0.9962	0.9816	0.9671	0.9671	1.0399	0.0	200.0
434.	00:28	00:00	7967.	208.31	208.31	329.38	0.9671	0.9671	0.9671	0.9671	0.9816	0.9962	0.9962	0.9671	0.0	201.0
			7958.	208.16	207.12	329.05	0.9816	0.9962	1.0399	0.9962	1.0399	0.9962	0.9671	1.0544	0.0	202.0
			7948.	206.83	206.97	329.72	1.0690	1.0690	1.0690	1.0981	1.1127	1.1127	1.1272	1.1127	0.0	203.0
			7941.	207.56	207.71	329.38	1.1127	1.1272	1.1127	1.1127	1.1127	1.0981	1.0981	1.0981	0.0	204.0
435.	00:28	00:00	7935.	207.86	208.75	329.05	1.0981	1.1127	1.0836	1.0836	1.0690	0.9671	0.9671	0.9962	0.0	205.0
			7930.	207.71	207.71	328.72	0.9962	0.9962	0.9962	0.9380	1.0399	1.0399	0.9962	0.9962	0.0	206.0
			7925.	207.71	207.86	328.40	0.9816	0.9671	1.0544	1.0544	1.0690	1.0690	0.9962	0.9962	0.0	207.0
			7921.	207.56	207.12	327.75	0.9380	0.9234	0.9671	1.0544	1.0836	0.9962	0.9962	1.0544	0.0	208.0

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TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
436.	00:29	00:00	7917.	206.83	206.38	328.08	1.0399	0.9962	0.9962	0.9962	0.9962	0.9962	0.9671	0.9671	0.0	209.0
			7913.	205.65	204.92	327.75	0.9962	0.9671	0.9671	0.9671	1.0399	0.9671	0.9671	1.0399	0.0	210.0
			7909.	204.77	205.65	327.43	1.0690	1.0544	1.0690	1.0690	0.9816	0.9816	0.9816	0.9671	0.0	211.0
			7906.	205.50	204.63	327.12	0.9816	0.9671	0.9671	1.0399	1.0544	0.9380	1.0399	0.9962	0.0	212.0
437.	00:29	00:00	7902.	204.63	204.05	326.49	0.9962	0.9962	0.9962	0.9962	1.0399	0.9816	0.9816	0.9234	0.0	213.0
			7899.	202.61	201.89	327.12	0.9088	0.9234	1.0544	0.9962	0.9962	0.9962	0.9962	0.9671	0.0	214.0
			7896.	201.32	200.61	325.87	0.9962	0.9962	1.0399	1.0399	0.9816	0.9671	0.9816	0.9962	0.0	215.0
			7893.	200.61	200.47	325.57	0.9962	0.9962	0.9380	0.8652	0.9234	0.9816	0.9234	0.9088	0.0	216.0
438.	00:29	00:00	7890.	199.21	198.37	326.18	0.9962	1.0544	1.0690	0.9816	0.9816	0.9962	0.9962	0.9088	0.0	217.0
			7887.	197.54	198.37	326.80	0.9234	0.9088	0.9671	1.0399	0.9671	0.9962	0.9962	0.9671	0.0	218.0
			7884.	196.31	197.82	327.43	0.9380	0.9380	0.9380	1.0399	1.0544	0.9962	0.9671	0.9962	0.0	219.0
			7880.	195.63	195.63	327.12	0.9671	1.0544	0.9671	0.9962	0.9962	0.9962	1.0690	0.9671	0.0	220.0
439.	00:29	00:00	7876.	197.54	198.37	327.43	1.0544	1.0544	1.0544	0.9525	1.0399	1.0544	0.8943	0.9962	0.0	221.0
			7873.	197.41	197.13	327.43	0.9525	0.9088	0.9380	0.9962	0.9962	0.9962	0.9962	1.0544	0.0	222.0
			7496.	198.65	197.54	327.12	1.0399	0.9671	0.9671	0.9962	1.0399	1.0399	0.9671	0.9816	0.0	223.0
			7476.	198.10	196.18	327.75	0.9962	0.9962	0.9380	0.9962	0.9671	0.9525	0.9962	0.9962	0.0	224.0
440.	00:29	00:00	7456.	193.89	194.83	328.40	0.9962	1.0399	0.9816	1.0399	0.9962	1.0399	0.9962	0.9234	0.0	225.0
			7435.	195.09	195.23	328.40	0.9234	1.0544	0.9380	1.0399	1.0399	1.0399	0.9234	0.9525	0.0	226.0
			7414.	194.02	194.02	328.72	1.0399	0.9671	0.9962	0.9962	1.0399	0.9380	1.0399	0.9380	0.0	227.0
			7396.	193.36	192.83	329.38	0.8943	0.9234	0.9380	0.9380	1.0399	1.0399	0.9234	0.9088	0.0	228.0
441.	00:29	00:00	7373.	192.18	191.27	329.38	0.8943	0.9234	0.9234	0.9234	0.9380	1.0690	0.9380	0.9088	0.0	229.0
			7350.	190.37	189.61	329.05	0.9088	1.0544	1.0399	0.9525	0.9380	0.9380	0.9088	0.8943	0.0	230.0
			7329.	189.10	189.61	329.05	0.8652	0.8506	0.8943	0.8943	0.8943	0.8943	0.8943	0.8943	0.0	231.0
			7295.	190.12	189.86	329.38	0.8943	0.9234	0.9088	0.9234	0.9234	0.9234	0.9525	0.9234	0.0	232.0
442.	00:29	00:00	7268.	191.40	191.14	329.38	1.0544	0.9962	1.0253	1.0399	0.9962	1.0690	0.9380	0.9234	0.0	233.0
			7236.	190.63	190.89	329.05	0.9088	0.9234	0.9234	0.8943	0.9234	0.9088	0.9380	1.0544	0.0	234.0
			7200.	191.40	191.66	329.38	0.9671	0.9962	0.9962	0.9962	0.9816	0.9962	0.9962	0.9962	0.0	235.0
			7167.	191.14	191.27	329.38	0.9816	0.9962	0.9962	0.9816	0.9525	0.9671	1.0399	0.9671	0.0	236.0
443.	00:29	00:00	7133.	191.79	191.79	329.72	1.0399	0.9671	1.0399	0.9671	1.0690	1.0836	1.0690	1.0690	0.0	237.0
			7096.	191.53	190.76	329.72	1.0399	1.0399	0.9671	0.9816	0.9671	0.9671	0.9671	0.9671	0.0	238.0
			7065.	191.27	190.37	329.38	0.9816	0.9816	0.9962	0.9380	0.9525	1.0399	0.9962	0.9671	0.0	239.0
			7036.	190.63	190.12	329.38	1.0399	0.9816	0.9816	0.9962	1.0544	1.0544	0.9671	1.0399	0.0	240.0
444.	00:29	00:00	7006.	190.76	191.27	329.05	0.9671	0.9671	0.9671	1.0544	1.0690	1.0544	0.9816	0.9962	0.0	241.0
			6973.	189.36	188.85	328.72	0.9962	0.9962	0.9962	0.9962	1.0399	0.9671	0.9816	0.9816	0.0	242.0
			6943.	189.23	189.36	328.40	0.9816	0.9671	0.9671	0.9816	0.9816	0.9671	0.9962	0.9962	0.0	243.0
			6913.	189.23	188.48	328.08	0.9816	0.9962	0.9962	0.9816	0.9671	0.9816	0.9962	0.9816	0.0	244.0
445.	00:29	00:00	5000.	187.61	187.73	328.40	0.9962	0.9962	0.9962	0.9962	0.9671	0.9816	0.9962	0.9671	0.0	245.0
			6854.	187.73	188.10	328.40	0.9671	0.9671	1.0399	0.9816	0.9962	0.9962	0.9671	0.9962	0.0	246.0
			6828.	186.26	186.87	327.43	0.9962	0.9816	0.9962	0.9816	0.9962	0.9816	0.9962	0.9962	0.0	247.0
			6802.	186.87	187.11	327.12	0.9962	0.9962	0.9962	0.9962	0.9962	1.0399	0.9962	1.0399	0.0	248.0
446.	00:29	00:00	6774.	186.75	186.87	327.12	1.0544	1.0399	0.9816	0.9962	0.9962	0.9816	0.9962	0.9962	0.0	249.0
			6748.	187.11	187.24	326.80	0.9962	0.9962	0.9962	0.9816	0.9962	0.9962	0.9671	0.9380	0.0	250.0
			6718.	187.24	186.75	326.18	0.9380	1.0399	1.0544	0.9380	0.9671	0.9962	0.9962	0.9816	0.0	251.0
			6687.	186.99	187.85	324.96	0.9671	0.9962	0.9962	0.9962	0.9816	0.9671	0.9962	0.9962	0.0	252.0
447.	00:29	00:00	6659.	188.35	188.85	323.49	0.9962	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	1.0399	0.0	253.0
			6630.	189.23	189.23	321.79	1.0399	0.9816	0.9671	0.9671	1.0690	0.9671	1.0399	0.9962	0.0	254.0
			6599.	188.48	187.61	320.44	0.9671	1.0544	1.0690	1.0690	0.9671	0.9962	1.0399	1.0981	0.0	255.0
			6569.	188.10	186.50	318.88	1.0690	0.9962	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	0.0	256.0
448.	00:29	00:00	6539.	187.36	187.88	317.88	0.9380	0.9380	1.0544	0.9380	1.0690	1.0399	0.9962	0.9380	0.0	257.0
			6504.	186.26	185.90	317.15	0.9234	1.0399	1.0399	0.9962	0.9962	0.9962	0.9816	0.9816	0.0	258.0
			6470.	185.66	184.46	315.51	0.9962	0.9816	0.9962	1.0253	1.0544	0.9234	0.8943	0.9380	0.0	259.0
			6435.	186.02	187.24	313.86	1.0399	1.0544	1.0399	1.0399	1.0399	0.9380	1.0399	1.0399	0.0	260.0
449.	00:29	00:00	6395.	186.99	188.23	312.43	1.0253	0.9962	0.9816	0.9671	1.0544	0.9962	0.9671	0.9816	0.0	261.0
			6355.	189.36	189.86	311.19	0.9816	0.9962	1.0399	1.0399	0.9671	1.0544	1.0690	0.9671	0.0	262.0
			6315.	190.89	191.27	310.42	1.0544	0.9671	0.9525	1.0544	0.9962	0.9816	0.9525	1.0690	0.0	263.0
			6277.	190.12	190.24	309.36	1.0544	0.9671	0.8943	0.8943	1.0544	1.0981	1.0690	1.0690	0.0	264.0
450.	00:29	00:00	6235.	192.05	191.53	307.44	0.9525	1.0690	1.1127	1.1127	1.1127	1.1272	1.1855	1.1272	0.0	265.0
			6198.	191.79	191.14	306.00	1.0836	1.0544	1.0399	0.9088	0.8943	1.0690	0.8943	0.8506	0.0	266.0
			6161.	191.66	191.01	305.71	0.9962	0.9962	0.9962	1.0544	1.0690	0.9671	1.1127	1.1272	0.0	267.0
			6122.	193.63	191.66	304.20	1.1272	1.1855	1.1709	1.0544	1.0399	1.0690	1.0399	1.0690	0.0	268.0

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
451.	00:30	00:00	6082.	191.53	193.76	302.96	1.0690	1.0836	1.0690	1.0836	1.0690	1.0690	0.9671	0.9816	0.0	269.0
			6051.	196.31	195.23	302.33	0.9671	0.9816	0.9962	0.9816	1.0690	1.0836	1.0836	0.9816	0.0	270.0
			6013.	192.31	193.10	301.36	1.0399	1.0690	1.0544	1.0836	1.1418	1.1709	1.0981	1.0544	0.0	271.0
			5984.	193.49	194.02	299.70	0.9671	1.0981	1.0981	1.0836	1.0690	1.0399	1.0544	1.0981	0.0	272.0
452.	00:30	00:00	5953.	193.10	192.57	298.33	1.1418	1.1418	1.1127	1.1272	1.0981	1.0544	0.9671	0.9816	0.0	273.0
			5922.	192.05	193.49	298.67	1.0399	1.0399	0.9962	0.9962	1.0399	1.0544	1.0399	1.0399	0.0	274.0
			5893.	194.02	193.49	298.33	1.0399	0.9962	0.9962	1.0544	1.0690	1.0981	1.1418	1.1272	0.0	275.0
			5868.	193.10	193.10	296.57	1.0836	1.0544	0.9671	1.0399	1.0690	0.9671	1.0399	1.0690	0.0	276.0
453.	00:30	00:00	5837.	193.49	195.77	295.48	0.9525	0.9816	1.0690	1.0690	1.0399	0.9671	0.9816	0.9380	0.0	277.0
			5811.	197.13	197.68	295.11	0.9380	1.0399	0.9380	1.0544	1.0399	1.0544	1.1855	1.2146	0.0	278.0
			5784.	198.37	198.51	294.38	1.1855	1.2000	1.1855	1.1272	1.0836	1.0544	0.9962	0.9962	0.0	279.0
			5763.	198.10	199.07	294.00	0.9816	0.9671	1.0399	0.9816	1.0690	1.1272	1.1272	1.0836	0.0	280.0
454.	00:30	00:00	5736.	197.96	195.63	292.49	1.0981	0.9671	1.0544	1.0690	1.0836	1.1272	1.1709	1.1272	0.0	281.0
			5715.	196.59	195.63	290.95	1.1272	1.1564	1.1272	1.0690	0.9816	1.0399	0.9962	0.9816	0.0	282.0
			5697.	195.09	196.59	290.56	1.0399	0.9671	1.0399	0.9671	1.0690	1.0399	1.0399	1.0690	0.0	283.0
			5678.	197.82	196.04	290.56	1.0981	1.1127	1.0981	1.1127	1.1272	1.1418	1.2292	1.1564	0.0	284.0
455.	00:30	00:00	5664.	195.63	198.51	289.37	1.0981	1.1564	1.0690	1.0836	1.1272	0.9671	1.0690	1.0690	0.0	285.0
			5649.	199.77	198.65	289.37	0.9380	0.9088	0.9962	0.9816	1.0399	0.9962	0.9525	0.9671	0.0	286.0
			5639.	199.91	197.82	288.57	1.0544	1.0981	1.1272	1.2000	1.1709	1.1418	1.1127	1.1709	0.0	287.0
			5630.	198.65	199.35	287.76	1.1418	1.0690	1.0690	0.9671	1.0399	1.0399	0.9671	1.0690	0.0	288.0
456.	00:30	00:00	5622.	198.37	197.54	287.76	1.0690	1.0981	1.0836	1.0981	1.1272	1.0981	1.0836	1.1272	0.0	289.0
			5621.	196.31	197.27	287.35	1.0981	1.0690	0.9380	0.9671	0.9816	0.9962	0.8943	0.9962	0.0	290.0
			5621.	194.16	193.49	287.35	0.9962	0.9962	0.9816	1.0399	0.9816	0.9962	0.9962	0.9962	0.0	291.0
			5621.	193.89	193.63	286.95	0.9816	0.9962	1.0399	0.9962	1.0544	1.0690	1.0544	1.0981	0.0	292.0
457.	00:30	00:00	5620.	193.49	193.10	286.53	1.1272	1.0836	1.0836	1.0836	1.0544	0.9816	0.9962	1.0399	0.0	293.0
			5620.	191.14	189.36	286.95	1.0544	0.9962	0.9816	0.9962	0.9962	0.9816	0.9962	0.9525	0.0	294.0
			5626.	188.23	186.50	286.53	0.9962	0.9816	0.9962	0.9962	1.0399	0.9962	0.9380	0.9234	0.0	295.0
			5625.	186.38	187.24	285.71	0.9380	0.9525	0.9088	0.9088	0.8652	0.8943	0.8797	0.8652	0.0	296.0
458.	00:30	00:00	5631.	187.24	186.50	284.88	0.8943	1.0399	0.9380	0.9962	1.0544	0.9380	1.0690	1.0690	0.0	297.0
			5628.	186.62	185.53	285.29	0.9816	1.0399	0.8943	0.9962	1.0399	1.0544	1.0399	0.9088	0.0	298.0
			5621.	185.78	183.75	286.95	0.8797	0.8943	0.9380	0.9816	1.0690	1.0399	0.9962	0.9380	0.0	299.0
			5617.	182.82	183.05	286.53	1.0399	1.0544	0.9234	0.8797	0.9088	0.8797	0.9088	0.9234	0.0	300.0
459.	00:30	00:00	5611.	182.48	183.64	286.95	0.9088	0.8943	0.9234	0.8943	1.0399	0.9816	0.9671	0.8943	0.0	301.0
			5605.	182.94	183.75	288.17	0.8215	0.8360	0.8652	0.9234	1.0690	1.0544	1.0544	0.8797	0.0	302.0
			5596.	182.94	182.94	288.97	0.8797	0.8943	0.9380	0.9671	1.0544	1.0399	0.9816	1.0399	0.0	303.0
			5583.	182.48	182.94	288.97	1.0544	0.9380	0.9088	0.9380	1.0544	0.9088	1.0690	1.0690	0.0	304.0
460.	00:30	00:00	5569.	183.87	183.87	289.77	0.8943	1.0690	0.9525	1.0399	1.0399	1.0399	1.0399	1.0690	0.0	305.0
			5557.	182.59	181.56	291.34	0.9234	0.9962	0.9816	1.0399	1.0399	1.0544	0.9088	0.8943	0.0	306.0
			5538.	180.55	180.32	292.11	0.9088	1.0399	1.0399	0.9962	1.0399	0.9962	1.0399	0.9962	0.0	307.0
			5518.	181.11	181.00	292.49	0.9962	0.9962	0.9962	0.9816	0.9671	1.0399	0.9671	0.9671	0.0	308.0
461.	00:30	00:00	5499.	180.77	180.88	292.11	0.9671	0.9671	1.0544	0.9816	0.9671	1.0544	0.9671	0.9671	0.0	309.0
			5484.	178.46	177.92	292.11	0.9816	1.0399	0.9380	0.9380	0.9088	0.9234	1.0690	0.9380	0.0	310.0
			5466.	178.24	176.96	291.72	0.9380	0.9380	0.9088	0.8943	0.8797	0.8652	0.8360	0.8069	0.0	311.0
			5445.	180.44	179.55	292.11	0.8360	0.8360	0.8797	1.0399	0.9671	0.9962	0.9671	0.9234	0.0	312.0
462.	00:30	00:00	5423.	179.44	181.33	291.72	1.0399	0.9962	0.9671	1.0690	0.9816	1.0544	0.9962	0.9962	0.0	313.0
			5396.	182.48	182.59	290.95	0.9962	1.0836	1.0836	1.0836	1.0836	1.0981	1.0836	1.0690	0.0	314.0
			5373.	182.82	178.89	289.77	1.0544	1.0981	1.0690	1.0836	0.8797	0.9380	0.9962	0.9962	0.0	315.0
			5350.	183.29	183.40	288.97	0.9380	0.9962	0.9962	0.8506	0.9380	0.9671	0.8797	0.7924	0.0	316.0
463.	00:30	00:00	5326.	183.64	181.33	288.57	0.8360	0.8652	0.8652	0.8943	0.9380	0.9525	0.8797	0.9380	0.0	317.0
			5303.	182.82	182.36	287.76	1.0544	0.9962	0.9962	0.9671	1.0544	0.9962	0.9671	0.9088	0.0	318.0
			5277.	182.94	180.55	286.53	0.8797	1.0544	0.9380	1.0544	1.0253	1.0690	1.0836	0.9671	0.0	319.0
			5251.	181.22	181.67	285.71	0.9962	0.9671	0.9671	0.9816	0.9671	1.0544	1.0399	1.0836	0.0	320.0
464.	00:30	00:00	5225.	182.48	183.87	285.29	0.9816	1.0544	1.0981	1.0690	0.9816	0.9671	1.0690	1.0836	0.0	321.0
			5196.	184.22	183.29	284.88	0.9380	1.0399	0.9671	0.9962	1.0690	0.9234	1.0108	0.9962	0.0	322.0
			5174.	183.75	184.11	283.61	0.9962	0.9962	0.9816	1.0544	1.0253	1.0399	1.0399	1.0399	0.0	323.0
			5149.	183.52	183.40	282.77	0.9671	0.9816	0.9816	0.9671	0.9671	0.9671	1.0544	0.9816	0.0	324.0
465.	00:30	00:00	5125.	183.75	183.64	281.48	0.9962	0.9816	0.9962	0.9962	0.9816	0.9816	0.9962	0.9962	0.0	325.0
			5096.	183.05	183.40	280.19	0.9816	0.9962	0.9962	0.9671	0.9962	1.0690	1.0544	0.9962	0.0	326.0
			5068.	182.59	182.59	278.88	0.9816	1.0399	0.9816	0.9962	0.9671	0.9816	0.9816	1.0690	0.0	327.0
			5040.	183.40	183.52	278.00	0.9525	1.0981	1.0690	1.0690	0.9962	0.9816	0.9671	1.0399	0.0	328.0

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
466.	00:31	00:00	5019.	183.05	182.82	277.13	1.0399	0.9962	0.9816	0.9816	0.9962	0.9962	0.9671	1.0399	0.0	329.0
			4992.	184.34	184.82	276.68	1.0399	0.9962	0.9962	0.9816	0.9962	0.9962	0.9962	0.9816	0.0	330.0
			4964.	183.64	182.94	275.80	1.0399	1.0399	0.9380	1.0690	1.0836	0.9671	0.9380	1.0544	0.0	331.0
			4936.	183.05	184.82	275.80	1.0544	0.9671	0.9380	1.0690	1.0690	1.0981	1.1272	1.0981	0.0	332.0
467.	00:31	00:00	4911.	184.94	186.02	275.80	1.0981	0.9816	0.9671	0.9962	0.9671	0.9816	0.9962	0.9671	0.0	333.0
			4889.	185.78	186.14	276.24	0.9816	0.9962	0.9671	0.9962	0.9962	0.9962	0.9816	0.9816	0.0	334.0
			4867.	186.50	186.87	275.36	0.9816	0.9962	0.9525	1.0399	0.9671	0.9816	0.9671	0.9962	0.0	335.0
			4845.	186.26	186.26	274.47	0.9816	0.9671	0.9962	0.9671	0.9816	1.0399	1.0690	0.9671	0.0	336.0
468.	00:31	00:00	4825.	187.48	188.60	274.47	1.1127	1.1272	1.0836	1.1272	1.0836	1.0399	1.0690	1.0544	0.0	337.0
			4806.	189.61	188.73	274.47	0.9816	1.0253	0.9671	0.9671	0.9962	1.0399	0.9816	1.0544	0.0	338.0
			4784.	189.36	187.85	274.91	0.9671	1.0544	0.9962	0.9962	0.9816	0.9525	0.9962	1.0253	0.0	339.0
			4769.	186.75	186.38	274.47	0.9671	0.9962	1.0399	0.9962	0.9962	0.9816	0.9671	0.9671	0.0	340.0
469.	00:31	00:00	4749.	186.75	187.48	274.02	1.0399	0.9671	1.0690	1.1127	1.0836	0.9671	0.9671	0.9671	0.0	341.0
			4734.	185.66	186.99	274.02	0.9671	1.0253	0.9671	1.0544	1.0690	0.9816	0.9962	0.9671	0.0	342.0
			4724.	185.90	185.66	274.47	1.0544	0.9816	1.0399	0.9671	1.1127	1.0836	1.0981	1.0981	0.0	343.0
			4705.	183.99	184.70	274.02	1.1272	1.0544	1.0690	0.9671	1.0690	0.9234	0.9088	0.8943	0.0	344.0
470.	00:31	00:00	4695.	182.13	180.21	274.47	0.9088	0.8943	0.9088	0.9962	0.9962	0.9088	0.9234	0.9962	0.0	345.0
			4682.	179.99	178.14	275.80	0.9962	0.9816	0.9671	0.9671	0.9962	0.9380	0.9088	0.9234	0.0	346.0
			4674.	177.71	178.46	276.24	0.9816	0.9816	0.9234	0.9671	1.0544	1.0544	0.9671	1.0399	0.0	347.0
			4659.	175.41	174.29	274.91	0.9234	0.9962	1.0690	0.9962	1.0399	0.8652	0.8506	0.8943	0.0	348.0
471.	00:31	00:00	4647.	177.60	175.92	274.91	0.8360	0.9088	0.9088	0.9234	0.9816	0.9962	0.9962	0.9671	0.0	349.0
			4631.	176.55	176.75	275.36	1.0399	0.9671	0.9380	0.9380	0.9671	0.9380	1.0399	0.9671	0.0	350.0
			4616.	176.23	176.13	275.80	1.0399	0.9380	1.0399	1.0399	0.9380	1.0399	1.0399	0.9671	0.0	351.0
			4599.	175.82	175.61	276.24	1.0399	1.0981	1.0690	0.9816	0.9671	0.9816	1.0544	1.0836	0.0	352.0
472.	00:31	00:00	4583.	174.90	174.69	276.24	1.0399	0.9671	0.9962	0.9962	0.9962	0.9234	0.9088	0.8943	0.0	353.0
			4562.	175.51	174.69	277.13	0.9380	0.9380	0.9380	0.8797	1.0690	0.9816	1.0690	1.0399	0.0	354.0
			4543.	174.79	175.92	278.00	1.0253	0.9816	0.9671	0.9671	0.9671	0.9962	0.9962	0.9671	0.0	355.0
			4525.	175.92	174.09	278.44	0.9816	0.9962	0.9816	1.0399	0.8943	0.8360	0.8360	0.8215	0.0	356.0
473.	00:31	00:00	4504.	174.19	175.30	279.32	0.8360	0.8797	0.9088	0.9671	0.9816	1.0836	1.1127	1.1127	0.0	357.0
			4478.	174.79	175.00	280.19	1.1127	0.9380	0.9816	0.9962	0.9671	0.9816	1.0690	1.0399	0.0	358.0
			4454.	174.49	174.79	280.62	0.9962	0.9816	1.0399	0.9962	0.9962	1.0690	0.9816	0.9962	0.0	359.0
			4430.	175.00	175.82	281.05	0.9671	1.0690	1.0253	0.9962	0.9671	0.9816	0.9525	1.0399	0.0	360.0
474.	00:31	00:00	4408.	175.71	175.51	281.48	0.9380	0.9962	0.9671	0.9671	1.0399	0.9962	0.9816	0.9671	0.0	361.0
			4386.	175.30	174.79	282.34	1.0399	1.0544	0.9671	0.9816	0.9525	0.9671	0.9962	0.9962	0.0	362.0
			4360.	175.30	175.00	283.19	0.9671	0.9671	0.9816	0.9671	1.0690	1.0690	1.0544	0.8797	0.0	363.0
			4337.	177.81	178.78	284.04	1.0690	1.0690	0.9816	0.9816	0.9088	0.8797	0.9088	0.9962	0.0	364.0
475.	00:31	00:00	4315.	183.29	179.99	285.29	0.9671	0.9380	0.8797	1.0690	0.9671	0.9816	1.0690	0.9671	0.0	365.0
			4289.	179.22	176.75	284.88	0.9234	1,0399	1.0399	0.9671	0.9380	1.1127	1.0690	0.9671	0.0	366.0
			4268.	178.03	178.03	285.29	0.9671	1.0399	1.1272	1.0690	1.0544	0.9380	1.0544	0.9088	0.0	367.0
			4246.	177.60	177.71	286.53	0.8652	0.8797	1.0981	0.9380	1.0690	0.8360	0.9671	1.0544	0.0	368.0
476.	00:31	00:00	4220.	179.44	183.29	286.53	0.9671	0.9671	1.0544	0.9525	0.9671	1.0981	1.1855	1.1418	0.0	369.0
			4196.	181.56	181.90	286.53	1.1272	0.9525	0.9380	1.0544	1.0399	1.0253	0.9962	0.9671	0.0	370.0
			4173.	181.22	180.44	286.53	0.9380	1.0253	0.9816	0.9671	1.0399	1.0253	0.9816	0.9671	0.0	371.0
			4148.	179.11	179.33	286.95	0.9816	1.0544	0.9380	0.9816	1.0253	0.9962	0.9816	0.9962	0.0	372.0
477.	00:31	00:00	4129.	178.57	179.44	286.95	0.9816	0.8360	0.9088	0.8943	0.9671	0.9671	0.9816	0.9380	0.0	373.0
			4105.	178.78	181.45	286.53	0.9962	0.9962	0.9962	0.9962	1.0544	1.0690	0.9525	0.9962	0.0	374.0
			4079.	181.67	180.44	285.29	1.0399	0.9816	0.9962	0.9962	0.9380	0.9962	0.9962	1.1272	0.0	375.0
			4063.	183.29	183.87	285.71	1.1418	1.1272	1.1127	1.1272	1.0981	0.9962	0.9962	0.9962	0.0	376.0
478.	00:31	00:00	4042.	182.59	182.48	287.35	0.9962	0.9962	0.9962	0.9816	0.9962	0.9088	0.8943	0.9234	0.0	377.0
			4021.	178.89	179.44	287.35	1.0544	0.9962	0.9234	1.0544	0.9962	0.9525	0.9671	1.1127	0.0	378.0
			4005.	180.32	182.25	287.76	1.0836	1.0690	1.0981	1.0690	0.9671	0.9671	0.9671	0.9816	0.0	379.0
			3989.	181.67	180.55	288.57	0.9962	0.9525	0.9380	0.9816	0.9816	0.9816	1.1127	1.0981	0.0	380.0
479.	00:31	00:00	3973.	180.66	179.99	288.97	1.0836	1.1418	1.1709	1.1418	1.1418	1.1418	1.1272	1.0836	0.0	381.0
			3959.	182.59	181.00	290.16	1.0690	0.9671	0.9962	0.9525	1.0836	1.0981	1.1127	1.0836	0.0	382.0
			3942.	181.67	180.55	291.34	0.9962	0.9962	1.0253	0.9962	1.0399	1.0399	0.9962	0.9380	0.0	383.0
			3928.	179.99	179.33	292.49	0.9088	0.9525	0.9962	0.9380	0.9671	0.9380	0.9816	0.9816	0.0	384.0
480.	00:31	00:00	3915.	178.24	176.86	294.38	0.9525	1.0399	0.9962	1.1418	1.1418	1.1127	1.0544	1.0690	0.0	385.0
			3904.	175.92	175.30	295.84	0.9962	0.9380	0.9088	0.8797	0.9380	0.9962	1.0544	0.9962	0.0	386.0
			3889.	175.20	175.30	296.92	0.8943	0.8360	0.8943	0.9962	0.9962	0.9962	0.9962	0.9816	0.0	387.0
			3871.	174.90	175.10	296.92	0.9816	1.0399	0.9671	1.0399	0.9380	0.9816	0.9962	0.9816	0.0	388.0

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TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
481.	00:32	00:00	3858.	172.51	172.71	298.33	1.0399	0.9525	0.9234	0.8943	0.8506	0.8943	0.9380	0.9380	0.0	389.0
			3836.	172.03	170.14	299.02	0.9671	0.9234	1.0399	0.9816	0.9671	1.0544	0.9380	0.9380	0.0	390.0
			3819.	170.61	169.68	299.02	1.0399	0.9671	0.9088	0.9234	0.8797	0.9088	0.8943	0.9380	0.0	391.0
			3799.	169.50	170.89	299.36	0.8797	0.9234	0.9525	0.9962	0.9671	1.0544	0.9962	0.9380	0.0	392.0
482.	00:32	00:00	3782.	169.77	169.68	300.03	0.8797	0.8943	0.9088	0.9380	0.9671	1.0399	0.9234	1.0399	0.0	393.0
			3756.	169.23	169.77	300.37	0.9816	1.0544	0.9962	0.9671	0.9816	0.9816	1.0399	0.9671	0.0	394.0
			3735.	168.86	167.71	300.70	1.0399	0.9088	0.9380	0.9671	0.9671	1.0690	0.9962	0.9962	0.0	395.0
			3714.	168.77	171.27	301.68	0.9962	0.9380	1.0981	1.0836	1.1272	1.0981	1.0836	1.0690	0.0	396.0
483.	00:32	00:00	3692.	170.24	172.90	302.64	1.0544	1.0690	1.0690	0.9380	0.9816	0.8943	0.9962	0.9962	0.0	397.0
			3660.	172.81	171.27	302.64	1.1418	1.1272	1.1855	1.0981	0.9088	0.8943	0.8360	0.9234	0.0	398.0
			3646.	168.96	167.80	304.81	1.0399	0.9525	0.9816	1.0690	1.0836	0.9671	0.9962	1.0690	0.0	399.0
			3629.	167.10	166.32	306.29	0.9962	0.8943	0.8360	0.9380	0.8943	0.8943	1.0544	1.0399	0.0	400.0
484.	00:32	00:00	3608.	165.98	167.27	305.41	0.9234	0.9671	0.9525	0.9671	1.0399	0.9816	0.9671	0.9671	0.0	401.0
			3585.	167.10	167.97	304.20	0.9816	0.9962	0.9671	0.9525	0.9816	0.9962	0.9816	0.9962	0.0	402.0
			3565.	166.24	166.32	304.20	0.9962	[illegible]	0.9962	0.9962	0.9525	1.0544	1.0399	0.9671	0.0	403.0
			3544.	165.98	167.80	304.51	0.9671	1.0544	0.9962	0.9525	0.865[illegible]	0.8652	0.8943	0.8943	0.0	404.0
485.	00:32	00:00	3523.	168.60	167.45	304.81	0.9962	0.9962	0.9816	0.9962	1.0690	1.1272	1.1418	1.1127	0.0	405.0
			3500.	165.31	163.44	304.20	1.0690	1.0544	0.9671	1.0690	0.9671	0.9962	0.9962	0.9962	0.0	406.0
			3478.	166.07	169.41	303.90	0.9088	0.9380	0.8943	0.9234	0.9525	0.9816	0.9380	0.9816	0.0	407.0
			3457.	169.77	168.86	304.81	0.9671	0.9671	1.0399	0.9962	1.0399	1.0544	0.9962	0.9962	0.0	408.0
486.	00:32	00:00	3436.	168.96	169.32	304.51	0.9671	0.9671	0.9962	1.0399	0.9816	0.9816	1.0399	0.9962	0.0	409.0
			3411.	168.60	169.50	302.96	1.0690	1.0399	0.9816	0.9962	1.0399	0.9671	0.9816	0.9671	0.0	410.0
			3391.	167.97	167.88	303.27	0.9671	0.9962	0.9962	0.9671	0.9671	0.9962	0.9671	0.9234	0.0	411.0
			3374.	168.51	169.05	304.81	0.9380	0.9671	0.9962	1.0399	1.0690	0.9962	0.9962	1.0399	0.0	412.0
487.	00:32	00:00	3354.	169.32	168.51	304.20	0.9962	0.9816	0.9816	0.9816	0.9962	0.9962	0.9816	0.9671	0.0	413.0
			3335.	168.42	168.86	303.59	1.0399	0.9671	0.9816	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	414.0
			3315.	169.68	171.27	303.90	0.9816	0.9962	0.9962	0.9962	0.9962	0.9671	0.9962	0.9380	0.0	415.0
			3299.	170.24	171.08	304.51	0.9962	1.0690	1.0544	1.0690	1.0544	1.0690	1.0690	1.0544	0.0	416.0
488.	00:32	00:00	3279.	172.13	172.13	303.59	1.0399	0.9671	0.9671	1.0690	1.0690	0.9525	1.0690	1.0690	0.0	417.0
			3262.	171.27	171.27	303.59	1.0544	0.9525	0.9816	0.9671	0.9671	0.9671	0.9962	0.9816	0.0	418.0
			3246.	170.89	170.42	303.59	0.9816	0.9816	0.9816	0.9525	0.9962	0.9962	1.0399	0.9816	0.0	419.0
			3232.	170.05	169.87	303.90	0.9962	0.9816	0.9816	0.9671	0.9671	0.9962	1.0399	0.9671	0.0	420.0
489.	00:32	00:00	3216.	169.59	169.23	304.20	0.9380	0.9525	0.9380	0.9525	0.9380	1.0544	1.0253	0.9671	0.0	421.0
			3207.	168.86	168.15	304.20	0.9525	1.0690	1.0981	1.0981	0.9962	0.9380	1.0690	0.9525	0.0	422.0
			3191.	169.77	169.68	303.90	0.9380	0.9671	0.9816	0.9671	0.9671	0.9671	0.9671	0.9816	0.0	423.0
			3180.	167.62	166.75	303.59	0.9816	0.9671	0.9525	1.0690	1.0544	1.0690	0.9816	0.9525	0.0	424.0
490.	00:32	00:00	3169.	168.60	168.24	304.20	1.0690	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	0.9671	0.0	425.0
			3160.	168.06	166.41	303.90	0.9962	0.9962	0.9816	0.9962	0.9671	0.9962	0.9962	0.9962	0.0	426.0
			3150.	165.90	164.98	303.59	1.0544	0.9234	0.9088	0.8943	0.8797	0.9088	0.8943	0.8943	0.0	427.0
			3136.	164.90	165.07	303.27	0.8943	0.8943	0.8943	0.8943	0.9088	1.0544	0.9380	0.9380	0.0	428.0
491.	00:32	00:00	3127.	164.16	164.33	303.27	0.9671	1.0544	0.9962	0.9816	0.9962	0.9962	0.9962	1.0253	0.0	429.0
			3117.	164.41	163.44	303.27	1.0253	1.0399	0.9962	0.9671	1.0544	1.0399	0.9962	0.9380	0.0	430.0
			3103.	163.68	162.81	302.96	1.0544	1.0253	0.9234	0.9525	0.9380	1.0690	1.0399	0.9380	0.0	431.0
			3089.	161.71	162.81	302.64	0.9088	1.0690	0.9380	0.9088	0.9380	1.0690	0.9088	0.8943	0.0	432.0
492.	00:32	00:00	3076.	162.89	162.03	302.33	0.9234	0.8797	1.0544	1.0399	0.9962	0.9525	0.9671	1.0253	0.0	433.0
			3061.	161.32	160.26	302.33	1.0399	0.9380	1.0399	0.9525	1.0399	1.0544	0.9962	0.9962	0.0	434.0
			3049.	159.68	160.34	301.68	1.0399	0.9962	0.9380	1.0690	0.9962	0.9380	1.0690	1.0690	0.0	435.0
			3035.	161.16	161.24	302.01	0.8943	1.0544	1.0690	0.9234	0.9088	0.8797	0.8360	0.8506	0.0	436.0
493.	00:32	00:00	3022.	160.02	160.51	302.96	0.9088	0.9380	0.9962	0.9962	0.9671	0.9816	0.9525	0.9962	0.0	437.0
			3009.	162.03	164.08	303.27	0.9816	0.9816	0.9671	1.0690	0.9671	0.9671	0.9816	1.0399	0.0	438.0
			2996.	163.13	163.84	303.27	0.9234	1.0544	0.9962	0.9962	0.9671	0.9816	0.9962	0.9816	0.0	439.0
			2986.	161.87	162.65	304.20	1.0836	1.1418	1.1272	1.1272	1.0544	0.9525	0.9671	0.9816	0.0	440.0
494.	00:32	00:00	2978.	163.68	164.16	305.11	0.9962	0.9962	1.0399	1.0253	1.0399	0.9962	0.9816	0.9816	0.0	441.0
			2969.	163.36	163.84	305.71	0.9380	0.9525	0.9671	0.9962	0.9816	1.0253	1.0399	1.0399	0.0	442.0
			2960.	163.20	164.33	304.51	0.9962	0.9962	1.0544	0.9671	0.9962	0.9671	0.9671	0.9962	0.0	443.0
			2952.	163.52	163.52	304.81	1.0399	1.0690	1.0690	0.9380	0.9380	1.0399	1.0253	0.9380	0.0	444.0
495.	00:32	00:00	2945.	163.84	162.73	305.41	0.9962	1.0399	0.9962	0.9816	0.9088	0.9525	1.0399	0.9525	0.0	445.0
			2938.	163.28	163.13	305.71	0.9962	0.9816	0.9671	0.9962	0.9671	0.9671	0.9816	0.9816	0.0	446.0
			2931.	163.60	164.98	303.90	0.9962	0.9380	0.9962	0.9816	1.0399	1.0690	1.0399	0.9962	0.0	447.0
			2922.	163.05	162.73	302.96	0.9816	0.9671	0.9816	0.9962	1.0690	1.0981	1.0399	0.9671	0.0	448.0

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NTSB DATA DUMP PROGRAM PAGE 12

27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
496.	00:33	00:00	2917.	165.07	162.89	302.33	0.9380	1.0690	0.9671	0.9671	0.9816	0.9962	0.9962	1.0690	0.0	449.0
			2912.	162.97	162.73	301.68	1.0253	1.0690	1.0399	0.9525	1.0836	1.0690	1.0399	0.9525	0.0	450.0
			2905.	162.89	164.98	301.68	0.9816	0.9816	0.9816	0.9671	0.9380	0.8943	0.9380	0.9234	0.0	451.0
			2901.	164.74	161.87	302.64	0.9088	0.9380	0.8797	0.9088	1.0690	0.9088	1.0836	0.9234	0.0	452.0
497.	00:33	00:00	2895.	161.79	163.52	302.96	1.0690	1.0690	1.0981	1.0836	1.0981	1.0981	1.0690	1.0836	0.0	453.0
			2890.	164.82	165.40	302.33	1.0690	0.9234	0.9962	1.0253	1.0544	1.0399	0.9671	0.9525	0.0	454.0
			2886.	163.92	163.05	302.01	0.9962	0.9962	0.9671	0.9525	1.0544	1.0544	0.9088	1.1272	0.0	455.0
			2881.	161.32	160.51	300.37	1.1272	1.0981	1.1127	1.0399	1.0253	0.9816	0.9962	0.9962	0.0	456.0
498.	00:33	00:00	2877.	160.51	160.91	300.03	0.9671	1.0399	0.9671	0.9816	0.9962	1.0399	1.0399	1.0690	0.0	457.0
			2874.	161.87	160.10	301.36	0.9962	1.0399	0.9088	0.9525	1.0690	1.0690	1.0836	1.0981	0.0	458.0
			2501.	160.51	159.85	301.03	1.0690	1.0690	1.0399	0.9816	0.9671	1.0399	0.9671	0.9962	0.0	459.0
			2484.	159.52	157.38	300.03	0.9671	0.9816	1.0544	0.9962	0.9962	0.9671	1.0690	0.9380	0.0	460.0
499.	00:33	00:00	2470.	158.33	157.38	299.70	1.0253	1.0253	0.9962	1.0399	0.9816	0.9816	0.9962	1.0399	0.0	461.0
			2454.	158.25	161.56	300.37	1.0253	1.0690	1.0690	0.9962	1.0399	1.0253	0.9962	0.9525	0.0	462.0
			2439.	160.10	158.16	300.70	0.9671	0.9234	1.0981	1.1127	1.1272	1.0981	1.0836	0.9962	0.0	463.0
			2426.	158.59	158.33	299.70	0.9380	0.9816	0.9671	0.9671	0.9671	0.9962	0.9962	0.9962	0.0	464.0
500.	00:33	00:00	2405.	156.04	156.85	299.36	1.0544	0.9671	1.0836	1.0253	0.8943	0.9380	0.9088	0.9234	0.0	465.0
			2396.	156.31	155.95	300.70	0.8797	1.0399	0.9671	0.9816	1.0253	0.9816	0.9816	0.9962	0.0	466.0
			2380.	156.58	156.58	302.01	0.9816	0.9816	0.9816	0.9671	0.9525	0.9380	0.9671	0.9816	0.0	467.0
			2364.	155.59	156.13	302.96	0.9671	0.9962	0.9962	0.9671	0.9962	0.9962	0.9234	0.9525	0.0	468.0
501.	00:33	00:00	2346.	155.41	154.85	303.90	0.9380	0.9671	0.9671	0.9671	0.9671	0.9671	0.9816	0.9816	0.0	469.0
			2335.	154.39	154.76	305.11	1.0399	1.0544	1.0399	0.9816	1.0544	0.9962	0.9525	0.9671	0.0	470.0
			2322.	153.35	153.83	306.29	1.0544	0.9380	1.0399	1.0253	0.9671	0.9962	0.9734	0.9962	0.0	471.0
			2300.	154.30	153.35	306.87	0.9525	0.9816	0.9671	0.9962	0.9962	0.9962	0.9671	1.0544	0.0	472.0
502.	00:33	00:00	2288.	152.68	152.09	307.44	0.9671	0.9962	0.9816	0.9671	1.0690	0.9380	0.9088	1.0544	0.0	473.0
			2268.	151.41	152.97	307.44	0.9380	0.9671	0.9962	1.0399	0.9088	0.9671	0.9962	0.8797	0.0	474.0
			2255.	153.64	151.80	305.71	1.0690	0.9380	1.0690	0.9671	0.9962	0.9671	0.9962	0.9671	0.0	475.0
*			2234.	152.09	152.39	304.81	0.9816	0.9816	0.9816	0.9962	0.9962	0.9962	0.9816	1.0399	0.0	476.0
503.	00:33	00:00	2143.	150.00	150.10	305.41	0.8943	0.8506	0.8797	0.9088	0.8943	1.0690	1.0399	1.0399	0.0	481.0
			2124.	149.18	148.97	304.51	0.9962	0.9671	1.0544	0.9816	0.9962	0.9962	0.9962	0.9671	0.0	482.0
			2096.	148.66	148.45	302.64	1.0544	0.9671	1.0399	0.9671	0.9816	0.9962	0.9962	0.9962	0.0	483.0
			2076.	147.93	148.24	302.01	0.9962	1.0399	1.0399	0.9962	0.9962	0.9962	0.9671	1.0399	0.0	484.0
504.	00:33	00:00	2055.	147.61	148.03	301.68	1.0690	1.0544	1.0690	1.0399	0.9671	1.0690	0.9671	1.0544	0.0	485.0
			2034.	148.35	149.08	300.70	0.9525	1.0544	1.0399	0.9525	0.9671	0.9380	0.9671	0.9671	0.0	486.0
			2014.	149.08	148.56	299.36	0.9816	0.9671	0.9816	0.9816	0.9962	1.0399	1.0399	1.0544	0.0	487.0
			1989.	148.56	148.77	297.98	0.9525	1.0399	0.9671	0.9962	0.9816	1.0544	1.0399	1.0399	0.0	488.0
505.	00:33	00:00	1971.	147.93	147.82	297.98	0.9671	0.9962	0.9962	0.9671	1.0690	1.0399	1.0399	0.9671	0.0	489.0
			1947.	146.97	147.29	298.67	0.9816	0.9962	0.9962	0.9816	0.9962	0.9962	0.9816	0.9816	0.0	490.0
			1931.	146.65	148.14	299.36	0.9962	0.9962	0.9962	0.9671	0.9962	0.9671	0.9671	0.9671	0.0	491.0
			1910.	146.86	147.08	299.02	0.9671	1.0544	0.9671	0.9671	0.9525	1.0690	1.0836	1.0690	0.0	492.0
506.	00:33	00:00	~~0.~~	146.43	145.78	299.02	1.0544	1.0399	0.9962	0.9962	0.9962	0.9962	1.0399	0.9816	0.0	493.0
			1870.	146.11	146.75	299.70	0.9962	1.0399	0.9962	0.9962	0.9962	0.9962	0.9816	0.9671	0.0	494.0
			1856.	144.34	144.67	300.37	1.0399	1.0544	0.9671	0.9816	0.9962	0.9671	0.9525	0.9671	0.0	495.0
			1840.	146.97	148.24	300.70	0.9671	1.0690	1.0690	1.0544	1.0690	1.0544	0.9671	1.0690	0.0	496.0
507.	00:33	00:00	1819.	148.87	149.08	301.03	0.9962	0.9671	0.9816	0.9816	0.9816	0.9816	0.9962	0.9671	0.0	497.0
			1803.	149.28	148.97	300.70	0.9816	0.9671	0.9962	0.9671	0.9525	0.9962	0.9671	0.9816	0.0	498.0
			1789.	147.61	147.93	300.03	0.9671	0.9671	0.9816	0.9962	0.9671	0.9671	0.9816	0.9962	0.0	499.0
			1775.	147.82	147.61	299.70	0.9671	0.9816	1.0253	0.9671	0.9816	1.0399	1.0399	1.0399	0.0	500.0
508.	00:33	00:00	1764.	146.65	146.65	299.36	1.0399	0.9962	0.9962	0.9962	1.0399	0.9962	0.9671	0.9962	0.0	501.0
			1749.	146.54	146.00	299.36	0.9962	0.9962	0.9962	1.0399	1.0544	0.9380	1.0399	1.0399	0.0	502.0
			1735.	145.34	145.56	298.67	1.0544	1.0399	0.9671	1.0399	1.0544	1.0544	0.9234	0.9380	0.0	503.0
			1722.	145.23	145.23	297.98	0.9962	1.0690	0.8943	0.9234	0.9088	0.9816	0.9671	0.9671	0.0	504.0
509.	00:33	00:00	1707.	144.79	144.90	296.21	0.9816	0.9671	0.9671	0.9962	0.9962	1.0399	0.9380	0.9234	0.0	505.0
			1688.	145.23	144.79	295.11	0.9671	0.9962	1.0399	1.0253	0.9962	0.9962	1.0253	0.9962	0.0	506.0
			1671.	143.66	143.10	293.63	0.9962	0.9380	0.9525	0.9962	0.9962	0.9962	1.0253	0.9962	0.0	507.0
			1657.	141.83	143.32	291.72	1.0399	0.9816	1.0399	0.9962	0.9962	0.9962	1.0399	1.0399	0.0	508.0
510.	00:33	00:00	1634.	143.44	142.87	289.77	0.9380	0.9380	0.9380	0.9671	1.0399	0.9962	0.9962	0.9962	0.0	509.0
			1616.	142.64	142.64	288.17	0.9962	1.0399	1.0399	1.0399	0.9962	0.9962	1.0544	1.0690	0.0	510.0
			1593.	142.75	141.71	286.95	0.8797	0.8652	0.8943	0.9234	0.9234	1.0544	1.0399	1.0399	0.0	511.0
			1569.	142.06	141.94	285.71	0.9816	0.9962	1.0253	0.9962	0.9962	0.9962	0.9962	0.9671	0.0	512.0

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TRIP DATE

S FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
511.	00:34	00:00	1545.	141.94	142.18	283.61	0.9816	0.9962	0.9962	0.9816	0.9671	0.9525	1.0836	0.9525	0.0	513.0
			1518.	142.06	142.18	281.91	0.9671	0.9816	0.9816	0.9671	0.9671	0.9962	0.9671	0.9671	0.0	514.0
			1491.	142.29	142.18	281.05	0.9671	1.0544	1.0544	1.0544	0.9380	1.0690	1.0690	1.0544	0.0	515.0
			1467.	142.75	142.64	279.75	1.0836	1.0690	1.0690	1.0399	1.0690	1.0690	1.0690	1.0690	0.0	516.0
512.	00:34	00:00	1439.	143.21	143.44	278.88	1.0690	0.9380	1.0836	1.0836	1.0690	1.0690	1.0690	1.0690	0.0	517.0
			1416.	143.21	143.55	277.57	1.0836	0.9525	1.0544	1.0690	1.0836	1.0836	1.0836	1.0690	0.0	518.0
			1395.	142.98	142.75	275.80	0.9234	0.9234	0.9671	0.9671	0.9816	0.9525	0.9671	0.9671	0.0	519.0
			1372.	143.89	142.87	274.91	0.9671	0.9816	0.9525	0.9671	0.9816	0.9816	0.9816	0.9962	0.0	520.0
513.	00:34	00:00	1351.	143.10	143.21	273.13	0.9962	0.9816	0.9962	0.9962	1.0253	0.9962	0.9962	0.9671	0.0	521.0
			1335.	141.83	142.64	271.34	1.0399	0.9962	1.0253	1.0399	1.0544	0.9962	0.9671	0.9816	0.0	522.0
			1315.	142.87	142.75	269.22	0.9962	0.9816	0.9671	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	523.0
			1292.	142.75	142.52	266.98	0.9816	0.9962	0.9962	0.9962	0.9816	0.9962	0.9816	0.9671	0.0	524.0
514.	00:34	00:00	1269.	141.94	141.60	264.76	0.9962	1.0399	0.9962	0.9671	0.9671	0.9671	0.9816	0.9671	0.0	525.0
			1249.	142.29	142.52	262.54	1.0399	0.9671	0.9671	0.9671	0.9671	0.9671	0.9816	0.9671	0.0	526.0
			1225.	142.87	142.98	260.36	0.9671	0.9671	0.9671	0.9816	0.9962	0.9962	0.9816	0.9671	0.0	527.0
			1201.	142.29	142.75	258.63	0.9962	0.9962	0.9962	1.0253	0.9962	0.9962	0.9962	0.9816	0.0	528.0
515.	00:34	00:00	1176.	142.29	142.18	257.34	0.9816	0.9816	0.9671	0.9671	0.9671	1.0690	1.0544	0.9525	0.0	529.0
			1151.	142.98	143.66	257.77	1.0399	1.0544	1.0399	0.9525	0.9671	1.0544	1.0399	0.9962	0.0	530.0
			1124.	143.66	143.66	256.92	0.9816	0.9671	0.9525	0.9671	0.9671	0.9671	0.9816	0.9962	0.0	531.0
			1100.	143.89	143.44	257.77	0.9962	0.9671	0.9671	0.9962	0.9816	0.9816	0.9525	0.9671	0.0	532.0
516.	00:34	00:00	1077.	143.89	143.55	258.20	0.9962	0.9816	0.9671	0.9671	0.9671	0.9816	0.9816	0.9962	0.0	533.0
			1054.	143.89	143.89	257.77	0.9962	0.9962	0.9816	0.9816	0.9671	0.9816	0.9962	0.9962	0.0	534.0
			1031.	144.34	144.00	257.77	0.9962	0.9816	0.9962	0.9671	0.9962	0.9671	0.9816	0.9671	0.0	535.0
			1008.	144.23	144.11	259.06	0.9816	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	536.0
517.	00:34	00:00	984.	143.89	143.32	259.92	0.9962	0.9962	0.9962	1.0399	0.9962	0.9671	0.9962	0.9962	0.0	537.0
			959.	143.55	143.55	261.23	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	538.0
			938.	143.89	143.78	262.54	0.9962	0.9962	0.9962	0.9962	0.9816	0.9816	0.9671	0.9962	0.0	539.0
			917.	143.89	143.89	263.43	0.9962	0.9962	0.9962	0.9816	0.9816	0.9962	0.9962	0.9962	0.0	540.0
518.	00:34	00:00	891.	144.23	144.45	264.31	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	541.0
			869.	144.56	145.01	265.64	0.9962	0.9816	0.9816	0.9962	0.9671	0.9671	0.9816	0.9671	0.0	542.0
			844.	145.67	145.45	266.98	0.9962	0.9671	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	0.0	543.0
			823.	145.34	145.34	267.43	0.9962	0.9962	0.9962	0.9962	1.0399	0.9962	0.9962	0.9962	0.0	544.0
519.	00:34	00:00	798.	145.67	145.78	267.43	0.9962	0.9962	0.9962	0.9816	0.9962	0.9962	0.9816	0.9962	0.0	545.0
			778.	145.56	145.67	266.54	0.9962	0.9962	0.9962	0.9816	0.9816	0.9962	0.9816	0.9816	0.0	546.0
			749.	146.11	146.32	266.09	0.9671	0.9962	0.9671	0.9671	0.9962	0.9816	0.9816	0.9671	0.0	547.0
			727.	146.43	146.43	265.64	0.9671	0.9962	0.9671	0.9671	0.9962	0.9962	0.9962	0.9962	0.0	548.0
520.	00:34	00:00	706.	147.18	147.08	265.20	0.9962	0.9962	0.9962	1.0399	0.9962	1.0399	0.9962	0.9962	0.0	549.0
			681.	147.29	147.61	263.87	0.9962	0.9816	0.9816	0.9671	0.9671	0.9671	1.0399	1.0544	0.0	550.0
			659.	147.93	147.29	262.54	0.9525	0.9380	0.9816	0.9671	1.0544	1.0399	1.0544	1.0690	0.0	551.0
			632.	147.40	146.54	259.49	1.0690	1.0690	0.9962	1.0544	1.0544	1.0399	0.9671	0.9525	0.0	552.0
521.	00:34	00:00	608.	146.54	146.32	255.65	0.9816	0.9525	0.9088	0.8797	0.8797	0.8943	0.8943	0.9671	0.0	553.0
			585.	147.18	146.11	253.98	0.9380	0.9088	0.9671	0.9380	1.0690	0.9962	0.9671	0.9816	0.0	554.0
			569.	146.43	145.56	253.16	1.0690	1.0690	0.9816	0.9962	0.9962	0.9962	0.9962	0.9671	0.0	555.0
			540.	147.72	147.72	251.53	1.0690	1.0690	1.0544	1.0690	1.0690	0.9816	1.0399	0.9962	0.0	556.0
522.	00:34	00:00	505.	147.50	145.78	249.15	0.9671	1.0981	1.0690	1.1127	1.1418	1.1418	1.1272	1.0981	0.0	557.0
			475.	146.86	146.43	247.60	1.1127	1.0981	1.0981	1.1127	1.0836	1.0544	1.0544	0.9816	0.0	558.0
			448.	146.43	148.14	247.60	0.9962	0.9962	0.9962	1.0399	0.9234	0.9962	0.9525	1.0544	0.0	559.0
			424.	147.61	146.32	247.60	1.0981	1.1272	1.1272	1.1272	1.0836	1.0690	1.0690	0.9525	0.0	560.0
523.	00:34	00:00	395.	147.61	147.08	246.84	1.0836	1.0690	1.1127	1.0690	1.0836	0.9380	1.0544	1.0690	0.0	561.0
			372.	146.65	145.01	246.84	0.9380	0.9671	0.9962	0.9962	0.9816	0.9088	0.9962	0.9234	0.0	562.0
			346.	146.11	147.18	246.84	0.9234	0.9816	0.9962	0.9380	1.0690	1.0690	1.0981	1.0981	0.0	563.0
			327.	146.00	146.21	245.35	1.0981	1.0836	1.0690	1.0836	1.1272	1.1272	1.1272	1.0981	0.0	564.0
524.	00:34	00:00	306.	146.97	145.67	243.52	1.0981	1.0544	0.9671	1.0399	1.0690	1.1418	1.1272	1.2000	0.0	565.0
			290.	145.01	143.66	244.98	1.1564	1.0836	1.0981	0.9816	0.9816	0.9234	0.8943	0.9234	0.0	566.0
			268.	141.94	142.06	250.73	0.8069	0.8360	0.8943	0.8797	0.8652	0.8360	0.9234	1.0399	0.0	567.0
			245.	141.71	140.18	254.40	0.9962	1.0544	0.9380	0.9816	0.9671	1.0690	1.1272	1.1272	0.0	568.0
525.	00:34	00:00	233.	140.89	141.83	252.75	1.2000	1.1564	1.1127	1.1564	1.1272	1.1418	1.0981	1.0690	0.0	569.0
			214.	140.77	137.88	249.94	1.0836	1.0690	1.1127	1.1418	1.1272	1.0690	0.9962	0.8506	0.0	570.0
			199.	136.65	137.02	250.33	0.7924	0.7778	0.7632	0.7778	0.7632	0.7778	0.7778	0.8360	0.0	571.0
			174.	136.02	134.37	253.57	0.8506	0.8506	0.8943	0.9234	0.9234	0.9380	0.9380	1.0544	0.0	572.0

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27-MAY-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S	FRAME	LAPSE	GMT	ALT EL	IAS H	IAS H	HEAD	VERG1H	VERG1H	VERG1H	VERG1H	VERG2H	VERG2H	VERG2H	VERG2H	FRMMSB	FRMLSB
	526.	00:35	00:00	154.	134.37	133.60	259.49	1.0399	0.9234	0.8943	0.8797	0.9380	0.8652	0.9380	1.0399	0.0	573.0
				123.	133.34	133.60	261.67	0.9962	1.0544	1.0690	1.1272	1.1564	1.1855	1.2437	1.2728	0.0	574.0
				120.	134.88	133.47	256.92	1.2000	1.2583	1.2000	1.2583	1.2874	1.2292	1.1709	1.1272	0.0	575.0
				99.	132.03	132.43	253.57	1.0544	1.0981	1.0981	1.1272	1.0836	0.9380	0.8360	0.8943	0.0	576.0
	527.	00:35	00:00	84.	131.50	129.63	251.13	0.9088	1.0399	0.9962	1.0399	0.9671	0.9525	0.9962	0.9671	0.0	577.0
				68.	129.90	128.28	251.94	0.9671	1.0690	1.0690	1.0399	0.9380	0.9671	1.0981	1.1709	0.0	578.0
				51.	127.18	125.93	253.98	1.1272	1.1564	1.1855	1.0690	1.0981	1.0544	1.1127	1.2437	0.0	579.0
*				~~0.~~	~~100.00~~	~~100.00~~	255.23	1.3020	~~0.4364~~	~~0.4364~~	~~0.4072~~	~~7.5191~~	~~4.7236~~	~~4.7236~~	~~0.9816~~	~~0.0~~	~~0.0~~
*	528.	00:35	:	~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
*				~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
*				~~0.~~	~~100.00~~	~~100.00~~	~~0.00~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.4364~~	~~0.0~~	~~0.0~~
				~~5.~~	248.11	247.82	350.79	0.9816	0.9962	1.0253	0.9816	0.9816	0.9962	0.9962	0.9962	1.0	1104.0
	529.	00:35	01:01	34990.	247.68	247.68	351.23	0.9962	0.9816	0.9816	0.9962	0.9962	0.9816	0.9962	0.9962	1.0	1105.0
				34990.	247.68	247.53	350.79	0.9962	0.9962	0.9962	0.9671	0.9671	0.9962	0.9671	0.9816	1.0	1106.0
				34986.	247.68	247.68	351.23	0.9671	0.9816	0.9962	0.9816	0.9671	0.9671	0.9962	0.9816	1.0	1107.0
				34984.	247.96	248.11	350.79	0.9962	0.9962	0.9671	0.9962	0.9962	0.9816	0.9962	0.9962	1.0	1108.0
	530.	00:35	01:01	34993.	247.96	247.96	350.79	0.9962	1.0253	0.9962	0.9962	0.9671	0.9671	0.9816	0.9671	1.0	1109.0
				34984.	248.11	247.82	350.79	0.9671	0.9816	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	1.0	1110.0
				34989.	248.25	248.25	351.23	0.9816	0.9816	0.9816	0.9962	0.9816	0.9962	0.9816	0.9962	1.0	1111.0
				34992.	247.82	247.82	351.23	0.9962	0.9962	0.9816	0.9816	0.9962	0.9962	0.9816	0.9962	1.0	1112.0
	531.	00:35	01:01	34990.	247.96	247.68	351.23	0.9962	0.9962	0.9962	0.9962	0.9816	0.9816	0.9962	0.9671	1.0	1113.0
				34995.	247.68	247.39	350.79	0.9962	0.9962	0.9816	0.9962	1.0399	1.0399	0.9962	0.9671	1.0	1114.0
				34995.	247.96	248.11	351.23	0.9962	0.9962	1.0253	0.9962	0.9962	0.9962	0.9962	1.0253	1.0	1115.0
				35000.	247.96	247.96	350.79	0.9816	0.9962	1.0399	1.0544	1.0399	1.0399	1.0399	1.0399	1.0	1116.0
	532.	00:35	01:01	35000.	248.11	248.11	350.79	1.0399	1.0399	0.9671	1.0399	1.0399	1.0399	0.9671	0.9962	1.0	1117.0
				35000.	247.82	248.11	351.23	0.9962	0.9962	0.9962	1.0253	0.9671	1.0399	0.9962	0.9962	1.0	1118.0
				35000.	248.25	248.39	351.23	0.9962	0.9962	1.0399	1.0253	0.9962	1.0399	1.0399	1.0399	1.0	1119.0
				35000.	248.11	248.11	351.23	0.9962	1.0253	0.9962	0.9671	0.9962	0.9962	0.9962	0.9816	1.0	1120.0
	533.	00:35	01:01	35000.	248.11	247.53	351.23	0.9962	1.0253	1.0399	1.0399	1.0399	1.0399	1.0399	1.0544	1.0	1121.0
				35000.	247.96	247.96	351.23	0.9816	0.9816	1.0399	0.9962	1.0253	0.9962	0.9962	0.9816	1.0	1122.0
				35000.	248.11	248.11	351.67	0.9962	0.9962	1.0253	0.9962	1.0253	1.0253	1.0399	0.9962	1.0	1123.0
				34998.	248.53	248.25	351.23	0.9962	0.9962	0.9816	0.9816	0.9962	0.9816	0.9962	0.9671	1.0	1124.0
	534.	00:35	01:01	34997.	248.25	248.25	351.23	0.9962	0.9962	0.9962	0.9962	1.0253	1.0399	1.0399	0.9962	1.0	1125.0
				34995.	248.39	248.53	351.23	0.9962	0.9962	0.9962	0.9816	0.9816	0.9816	0.9962	0.9816	1.0	1126.0
				34995.	248.25	248.25	351.23	0.9816	0.9962	0.9962	0.9816	0.9962	1.0253	0.9962	0.9962	1.0	1127.0
				34997.	248.11	248.11	351.23	0.9962	0.9962	0.9962	0.9962	0.9962	0.9816	0.9962	0.9962	1.0	1128.0
	535.	00:35	01:01	34993.	248.25	248.11	351.23	0.9816	0.9962	0.9962	0.9816	0.9962	0.9962	0.9962	0.9962	1.0	1129.0
				34992.	247.96	248.11	351.23	0.9816	0.9816	0.9962	0.9962	0.9962	0.9962	0.9962	0.9962	1.0	1130.0
				34990.	248.11	248.11	351.23	0.9962	0.9816	0.9962	0.9671	0.9962	0.9962	0.9962	0.9816	1.0	1131.0
				34990.	247.96	248.11	351.23	0.9962	0.9816	1.0253	0.9962	0.9962	0.9962	0.9962	0.9816	1.0	1132.0

← 25 hr. old data

END OF FILE OR DUMP LIMIT REACHED

123

DISCRETE DATA DUMP
DUMP VARIABLE DICTIONARY

MNEMONIC	PARAMETER NAME
VHF1	VHF 1 KEYING

END OF PARAMETER LIST THIS PASS

BEGINNING DUMP OF PASS PARAMETERS

NTSB DATA DUMP PROGRAM PAGE 1
14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
331.	00:22	01:01	1 1 1 1
332.	00:22	01:01	1 1 1 1
333.	00:22	01:01	1 0 0 0
334.	00:22	01:01	0 0 0 0
335.	00:22	01:01	0 1 1 1
336.	00:22	01:01	1 1 1 1
337.	00:22	01:01	1 1 1 1
338.	00:22	01:01	1 1 1 1
339.	00:22	01:01	1 1 1 1
340.	00:22	01:01	1 1 1 1
341.	00:22	01:01	1 1 1 1
342.	00:22	01:01	1 1 1 0
343.	00:22	01:01	0 0 0 0
344.	00:22	01:01	0 0 0 0
345.	00:22	01:01	0 0 0 1

135

14-JUN-88 TACA B737-300 AT MUSHUD. LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
346.	00:23	01:01	1 1 1 1
347.	00:23	01:01	1 1 1 1
348.	00:23	01:01	1 1 1 1
349.	00:23	01:01	1 1 1 1
350.	00:23	01:01	1 1 1 1
351.	00:23	01:01	1 1 1 1
352.	00:23	01:01	1 1 1 1
353.	00:23	01:01	1 1 1 1
354.	00:23	01:01	1 1 1 0
355.	00:23	01:01	0 0 1 1
356.	00:23	01:01	1 1 1 1
357.	00:23	01:01	1 1 1 1
358.	00:23	01:01	1 1 1 1
359.	00:23	01:01	1 1 0 1
360.	00:23	01:01	1 0 0 0

136

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
361.	00:24	01:01	0 0 0 0
362.	00:24	01:01	0 0 0 0
363.	00:24	01:01	0 0 0 0
364.	00:24	01:01	1 1 1 1
365.	00:24	01:01	1 1 1 1
366.	00:24	01:01	1 1 1 1
367.	00:24	01:01	1 1 1 1
368.	00:24	01:01	1 1 1 1
369.	00:24	01:01	1 1 1 1
370.	00:24	01:01	1 1 1 1
371.	00:24	01:01	1 1 1 1
372.	00:24	01:01	1 1 1 1
373.	00:24	01:01	1 1 1 1
374.	00:24	01:01	1 1 1 1
375.	00:24	01:01	1 1 1 1

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
376.	00:25	01:01	1
377.	00:25	01:01	1
378.	00:25	01:01	1
379.	00:25	01:01	1
380.	00:25	01:01	1
381.	00:25	01:01	1
382.	00:25	01:01	1
383.	00:25	01:01	1
384.	00:25	00:01	1
385	00:25	00:00	1
386.	00:25	00:00	1
387.	00:25	00:00	1
388	00:25	00:00	1
389.	00:25	00:00	1
390.	00:25	00:00	1

POWER INTERRUPT

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
391.	00:26	00:00	0 0 0 0
392.	00:26	00:00	0 0 0 0
393.	00:26	00:00	0 0 1 1
394.	00:26	00:00	1 1 1 1
395.	00:26	00.00	1 1 0 0
396.	00:26	00:00	0 0 0 1
397.	00:26	00:00	1 1 1 1
398	00:26	00:00	1 0 1 1
399.	00:26	00:00	1 1 1 1
400.	00:26	00:00	1 1 1 1
401.	00:26	00:00	1 1 1 1
402.	00:26	00:00	0 0 1 1
403.	00:26	:	1 0 0 0
404	00:26	00:00	1 1 1 1
405	00:26	00:00	1 1 1 1

NTSB DATA DUMP PROGRAM PAGE 6
14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
406.	00:27	00:00	1
			1
			1
			1
407.	00:27	00:00	1
			1
			1
			1
408.	00:27	00:00	1
			1
			1
			1
409.	00:27	00:00	1
			1
			0
			1
410.	00:27	00:00	1
			1
			1
			0
411.	00:27	00:00	0
			0
			1
			1
412.	00:27	00:00	1
			1
			1
			1
413.	00:27	00:00	1
			1
			1
			1
414.	00:27	00:00	1
			1
			0
			0
415.	00:27	00:00	1
			1
			1
			1
416.	00:27	00:00	1
			1
			1
			1
417.	00:27	00:00	1
			1
			1
			1
418.	00:27	00:00	1
			1
			1
			1
419.	00:27	00:00	1
			1
			1
			1
420.	00:27	00:00	1
			1
			1
			1

130

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
421.	00:28	00:00	1
			1
			1
			1
422.	00:28	00:00	1
			1
			1
			1
423.	00:28	00:00	1
			1
			1
			1
424.	00:28	00:00	1
			1
			0
			1
425.	00:28	00:00	1
			1
			1
			1
426.	00:28	00:00	1
			1
			1
			1
427.	00:28	00:00	1
			1
			1
			0
428.	00:28	00:00	0
			0
			0
			0
429.	00:28	00:00	1
			1
			1
			1
430.	00:28	00:00	1
			1
			1
			1
431.	00:28	00:00	1
			1
			0
			0
432.	00:28	00:00	0
			0
			1
			1
433.	00:28	00:00	0
			0
			0
			0
434.	00:28	00:00	0
			0
			0
			0
435.	00:28	00:00	0
			0
			0
			0

```
                   NTSB DATA DUMP PROGRAM                         PAGE     6
14-JUN-88  TACA B737-300 AT MUSHUD. LA. 5-24-88

  TRIP     DATE

S FRAME LAPSE    GMT   VHF1

    406. 00:27 00:00    1
                        1
                        1
                        1
    407  00:27 00:00    1
                        1
                        1
                        1
    408. 00:27 00:00    1
                        1
                        1
                        1
    409. 00:27 00:00    1
                        1
                        0
                        1
    410. 00:27 00:00    1
                        1
                        1
                        0
    411. 00:27 00:00    0
                        0
                        1
                        1
    412. 00:27 00:00    1
                        1
                        1
                        1
    413. 00:27 00:00    1
                        1
                        1
                        1
    414. 00:27 00:00    1
                        1
                        0
                        0
    415. 00:27 00:00    1
                        1
                        1
                        1
    416. 00:27 00:00    1
                        1
                        1
                        1
    417. 00:27 00:00    1
                        1
                        1
                        1
    418. 00:27 00:00    1
                        1
                        1
                        1
    419  00:27 00:00    1
                        1
                        1
                        1
    420  00:27 00:00    1
                        1
                        1
                        1
```

130

NTSB DATA DUMP PROGRAM PAGE 7
14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
421.	00:28	00:00	1
			1
			1
			1
422.	00:28	00:00	1
			1
			1
			1
423.	00:28	00:00	1
			1
			1
			1
424.	00:28	00:00	1
			1
			0
			1
425.	00:28	00:00	1
			1
			1
			1
426.	00:28	00:00	1
			1
			1
			1
427.	00:28	00:00	1
			1
			1
			0
428.	00:28	00:00	0
			0
			0
			0
429.	00:28	00:00	1
			1
			1
			1
430.	00:28	00:00	1
			1
			1
			1
431.	00:28	00:00	1
			1
			0
			0
432.	00:28	00:00	0
			0
			1
			1
433.	00:28	00:00	0
			0
			0
			0
434.	00:28	00:00	0
			0
			0
			0
435.	00:28	00:00	0
			0
			0
			0

131

NTSB DATA DUMP PROGPAM
14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S	FRAME	LAPSE	GMT	VHF1
	436.	00:29	00:00	0
				0
				1
				1
	437.	00:29	00:00	1
				1
				1
				0
	438.	00:29	00:00	0
				0
				0
				0
	439.	00:29	00:00	1
				1
				1
				1
	440.	00:29	00:00	1
				1
				1
				1
	441.	00:29	00:00	1
				1
				1
				1
	442.	00:29	00:00	1
				1
				1
				1
	443.	00:29	00:00	1
				1
				1
				0
	444.	00:29	00:00	0
				1
				1
				1
	445.	00:29	00:00	1
				1
				1
				1
	446.	00:29	00:00	1
				0
				1
				1
	447.	00:29	00:00	1
				1
				1
				1
	448.	00:29	00:00	1
				1
				1
				1
	449.	00:29	00:00	1
				1
				1
				1
	450.	00:29	00:00	1
				1
				1
				1

132

NTSB DATA DUMP PROGRAM

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

5 FRAME	LAPSE	GMT	VHF1
451.	00:30	00:00	1
			1
			1
			1
452.	00:30	00:00	1
			1
			1
			1
453.	00:30	00:00	1
			1
			1
			1
454.	00:30	00:00	1
			1
			1
			1
455.	00:30	00:00	1
			1
			1
			1
456.	00:30	00:00	1
			1
			1
			1
457.	00:30	00:00	0
			0
			0
			0
458.	00:30	00:00	0
			0
			1
			1
459.	00:30	00:00	1
			1
			1
			1
460.	00:30	00:00	0
			0
			1
			1
461.	00:30	00:00	1
			1
			0
			1
462.	00:30	00:00	1
			1
			1
			1
463.	00:30	00:00	1
			0
			1
			1
464.	00:30	00:00	1
			1
			1
			1
465.	00:30	00:00	1
			1
			1
			1

133

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
466.	00:31	00:00	1 1 1 1
467.	00:31	00:00	1 1 0 1
468.	00:31	00:00	1 1 1 1
469.	00:31	00:00	0 1 1 1
470.	00:31	00:00	1 1 1 1
471.	00:31	00:00	1 1 0 0
472.	00:31	00:00	0 0 0 0
473.	00:31	00:00	0 0 0 0
474.	00:31	00:00	0 1 1 1
475.	00:31	00:00	1 1 0 1
476.	00:31	00:00	1 1 1 1
477.	00:31	00:00	1 1 1 1
478.	00:31	00:00	1 1 1 0
479.	00:31	00:00	1 1 1 1
480.	00:31	00:00	1 1 1 1

134

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
481.	00:32	00:00	1
			1
			1
			1
482.	00:32	00:00	1
			1
			1
			1
483.	00:32	00:00	1
			1
			1
			1
484.	00:32	00:00	1
			1
			0
			0
485.	00:32	00:00	0
			0
			0
			0
486.	00:32	00:00	1
			1
			1
			1
487.	00:32	00:00	1
			1
			1
			1
488.	00:32	00:00	1
			1
			0
			0
489.	00:32	00:00	0
			0
			0
			0
490.	00:32	00:00	0
			0
			0
			0
491.	00:32	00:00	0
			0
			0
			0
492.	00:32	00:00	0
			0
			0
			1
493.	00:32	00:00	1
			1
			1
			1
494.	00:32	00:00	1
			1
			1
			1
495.	00:32	00:00	0
			0
			0
			0

135

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
496.	00:33	00:00	0
			1
			1
			1
497.	00:33	00:00	1
			1
			1
			1
498.	00:33	00:00	1
			0
			1
			1
499.	00:33	00:00	1
			1
			1
			1
500.	00:33	00:00	1
			1
			1
			1
501.	00:33	00:00	1
			1
			1
			0
502.	00:33	00:00	0
			0
			1
			1
503.	00:33	00:00	1
			1
			1
			0
504.	00:33	00:00	0
			0
			1
			1
505.	00:33	00:00	1
			1
			1
			1
506.	00:33	00:00	1
			1
			1
			1
507.	00:33	00:00	1
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			0
			0
509.	00:33	00:00	0
			0
			0
			1
510.	00:33	00:00	1
			1
			1
			1

136

14-JUN-88 TACA B737-300 AT MUSHUD, LA. 5-24-88

TRIP DATE

S FRAME	LAPSE	GMT	VHF1
511.	00:34	00:00	1 1 1 1
512.	00:34	00:00	1 1 1 0
513.	00:34	00:00	0 0 0 0
514.	00:34	00:00	0 0 1 1
515.	00:34	00:00	1 1 1 1
516.	00:34	00:00	1 1 1 1
517.	00:34	00:00	1 1 1 1
518.	00:34	00:00	1 1 1 1
519.	00:34	00:00	1 1 1 1
520.	00:34	00:00	1 1 1 1
521.	00:34	00:00	1 1 1 0
522.	00:34	00:00	1 1 1 1
523.	00:34	00:00	1 1 1 1
524.	00:34	00:00	1 1 1 1
525.	00:34	00:00	1 1 1 1

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                    NTSB DATA DUMP PROGRAM                    PAGE   14
14-JUN-88  TACA B737-300 AT MUSHUD, LA. 5-24-88

   TRIP    DATE

S FRAME LAPSE   GMT  VHF1

     526. 00:35 00:00   1
                        1
                        1
                        1
     527. 00:35 00:00   1
                        1
                        1
                        1
     528. 00:35   :     0
                        0
                        0
                        1
     529. 00:35 01:01   1
                        1
                        1
                        1
     530. 00:35 01:01   1
                        1
                        1
                        1
     531. 00:35 01:01   1
                        1
                        1
                        1
     532. 00:35 01:01   1
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     533. 00:35 01:01   1
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                        1
                        1
     534. 00:35 01:01   1
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                        1
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     535. 00:35 01:01   1
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                        1
                        1

END OF FILE OR DUMP LIMIT REACHED
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25 hr old data

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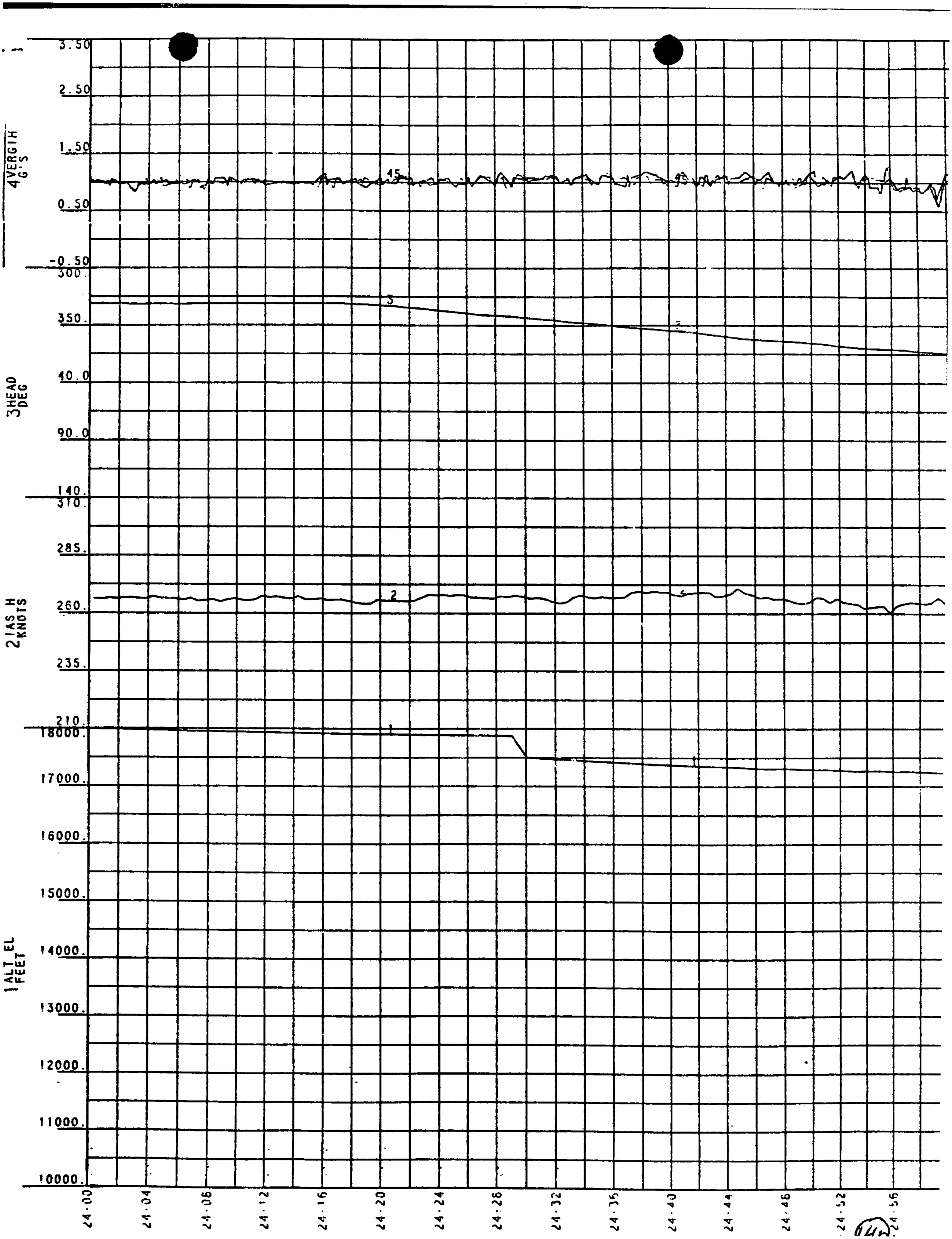
ATTACHMENT II
DATA PLOT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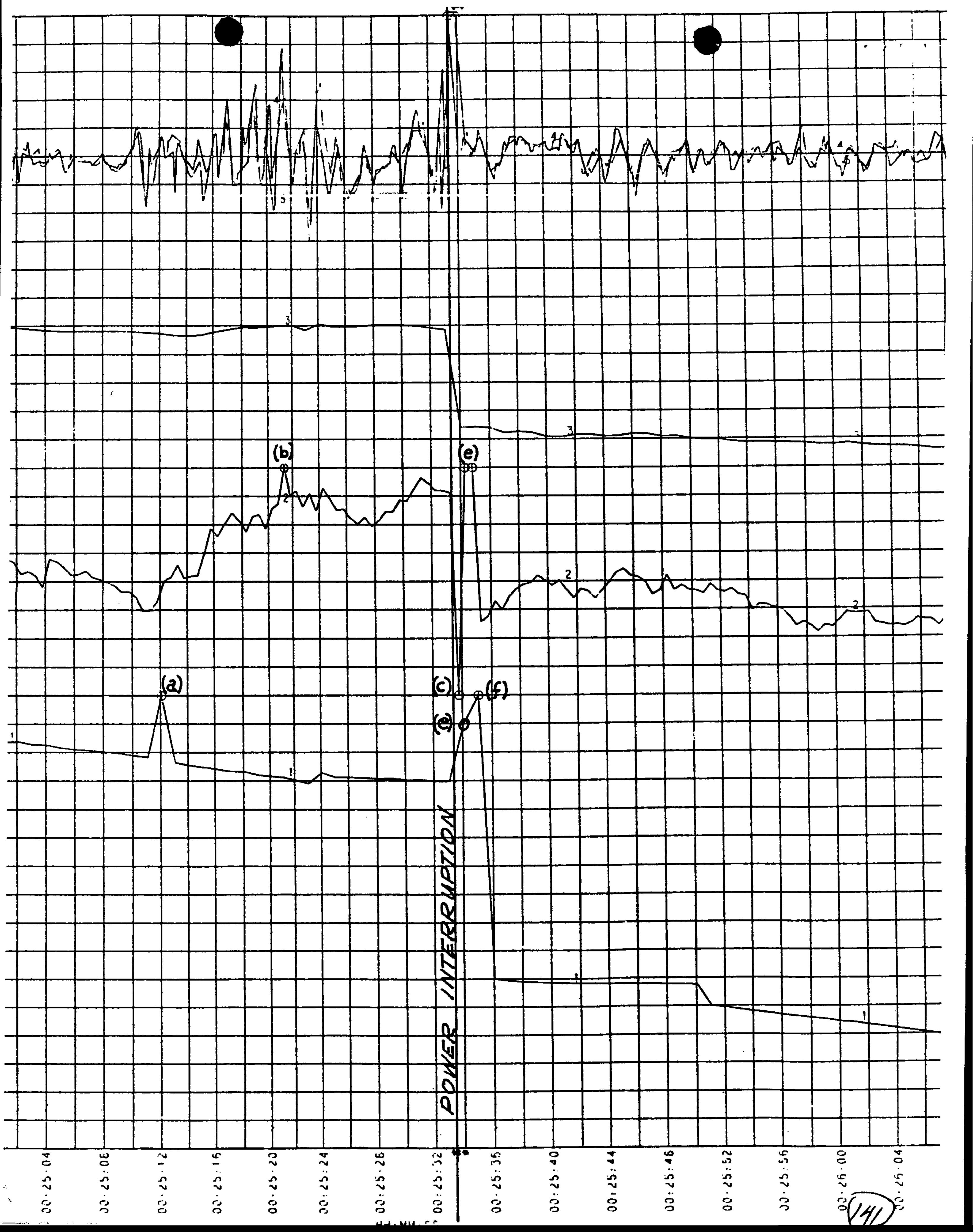
3.50
2.50
1.50
0.50
-0.50
3 HEAD DEG
300.
350.
40.0
90.0
140.
2 IAS H KNOTS
310.
285.
260.
235.
210.
1 ALT EL FEET
18000.
17000.
16000.
15000.
14000.
13000.
12000.
11000.
10000.
24·00
24·04
24·08
24·12
24·16
24·20
24·24
24·28
24·32
24·36
24·40
24·44
24·48
24·52
24·56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(b)
(c)
(e)
(e)
(f)
POWER INTERRUPTION
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00:25:08
00:25:12
00:25:16
00:25:20
00:25:24
00:25:28
00:25:32
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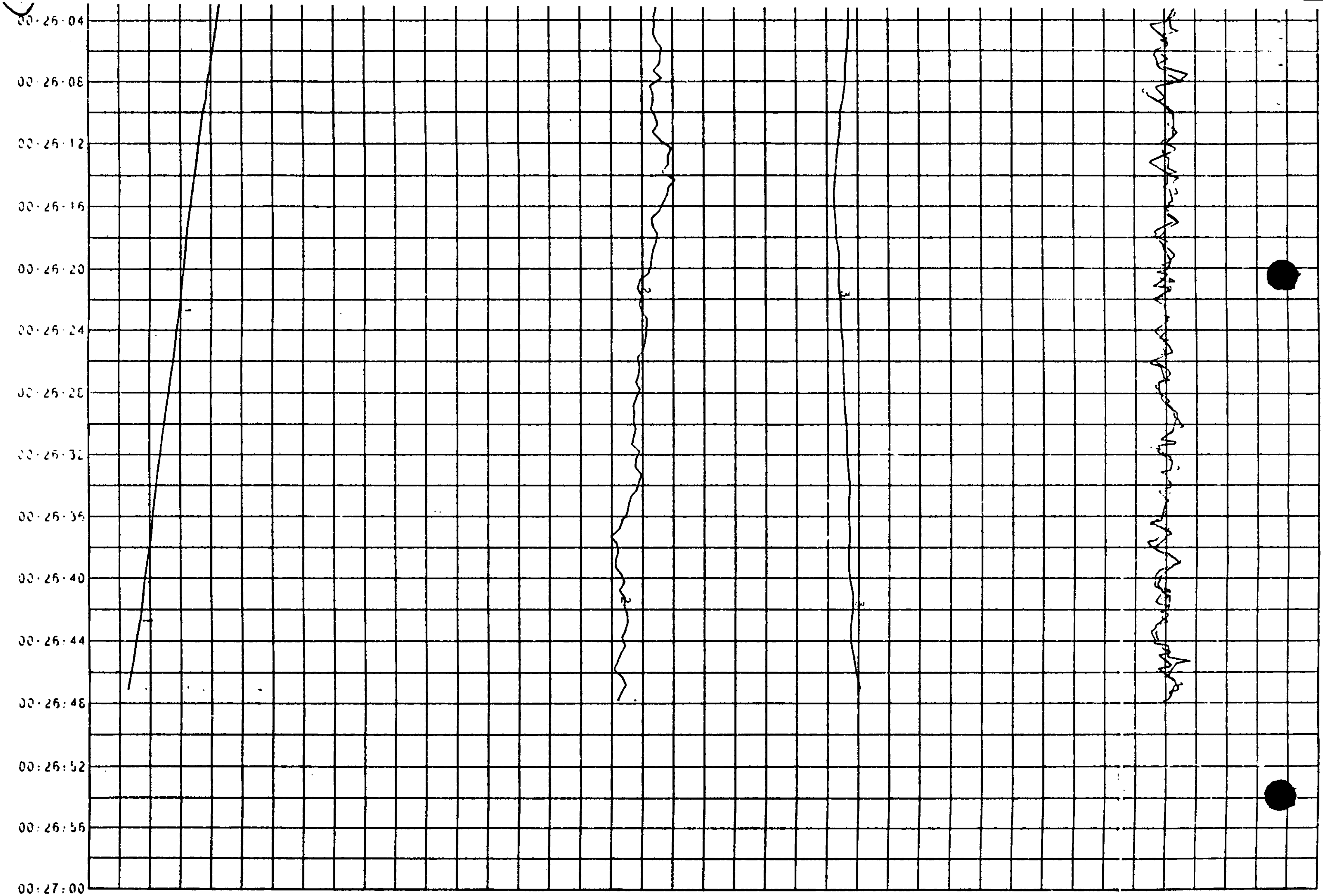
00:26:00
00:26:04



NATIONAL TRANSPORTATION SAFETY BOARD
BUREAU OF TECHNOLOGY
WASHINGTON, D. C.

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CVR Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D. C.

SPECIALIST'S FACTUAL REPORT OF INVESTIGATION
COCKPIT VOICE RECORDER

BY

JAMES R. CASH
AIR SAFETY INVESTIGATOR

WARNING

The reader of this report is cautioned that the transcription of a CVR tape is not a precise science but is the best product possible from an NTSB group investigative effort. The transcript, or parts thereof, if taken out of context, could be misleading. The attached CVR transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D.C.

July 28, 1988

Group Chairman's Factual Report of Investigation
Cockpit Voice Recorder

FTW-88-MA-109

A. ACCIDENT

Location: Near New Orleans, Louisiana

Date : May 24, 1988

Time : 1256 Central Daylight Savings Time (CDT)

Aircraft: TACA International Airlines, Boeing 737-300 N75356

B. GROUP

James R. Cash, National Transportation Safety Board, Chairman

Stephen W. Morrison, Federal Aviation Administration, Member

*D. P. Scott, TACA International Airlines, Member

*L. G. Alfaro, TACA International Airlines, Member

*Denotes Spanish/English speaking group members.

C. SUMMARY

A Fairchild Model A-100A Cockpit Voice Recorder (CVR) SN 52350 was brought to the audio laboratory of the National Transportation Safety Board. A transcript was prepared of the airborne portion of the excellent quality 32 minute recording (attached). Almost half of the recording covering the critical time before the event was inadvertently errased by the application of auxiliary electrical power by post-accident investigative personnel.

D. DETAILS OF INVESTIGATION

The majority of the inter-cockpit conversations were in Spanish. These conversations were transcribed in Spanish and then translated to English by the two Spanish/English speaking group members. All of the radio transmissions to New Orleans approach control were in English.

The recording starts at 1250:30 CDT as the flight is desending through approximately 5,000 feet and being vectored by New Orleans approach control. The flight crew is attempting to restart the aircraft's engines at this point. The verbatim transcript continues until 1256:01 CDT, after the aircraft has come to a stop and the cabin emergency evacuation has been ordered by the Captain. The recording continues for another six minutes and forty seven seconds until the flight crew reenters the cockpit and shuts down the auxiliary power unit (APU) at 1302:48 CDT.

Electrical power was re-applied to the cockpit voice recorder some unknown time later. The CVR unit was activated for approximately one minute and forty two seconds, at which time the flight crew was being questioned by an English speaking person as to the amount of fuel on board the aircraft.

Electrical power was again re-applied some unknown time later and the CVR continued to run for seventeen minutes and fifty three seconds. During this time the recording contained English speaking voices and conversations relating to cockpit switch documentation.

The cockpit voice recorder in transport aircraft is wired so that it operates whenever AC electrical power is applied to the aircraft. This AC power can be supplied by a external AC supply or it can be internally generated by the APU or the aircraft's engines. There is no switch in the cockpit to turn off the CVR. The only means the flight crew has to stop the CVR is to remove electrical power to it by pulling the CVR circuit breaker in the cockpit. Ground personnel can also physically remove the CVR from the aircraft which obviously stops the recording process. In this accident, over half of the total 32 minute recording of the accident was erased by the re-application of electrical power to the aircraft.

[redacted]

James R. Cash
Electrical Engineer

TRANSCRIPT PF A FAIRCHILD MODEL A-100A COCKPIT VOICE RECORDER S/N 52350 REMOVED FROM TACA INTERNATIONAL AIRWAYS BOEING 737-300 AIRCRAFT WHICH WAS INVOLVED IN AN ACCIDENT ON MAY 24, 1988

CAM	Cockpit area microphone voice or sound source
TCAM	Translation into English of Cockpit Area Microphone Voices
RDO	Radio transmission from accident aircraft
-1	Voice identified as Captain
-2	Voice identified as First Officer
-3	Voice identified as Jump Seat Pilot
-4	Voice identified as Dead Heading Company Pilot
-5	Voice identified as Female Flight Attendent
-?	Voice unidentified
APP	New Orleans Radar Approach Control
GPWS	Ground Proximity Warning System
UNK	Unknown
*	Unintelligible word
@	Nonpertinent word
#	Expletive deleted
%	Break in continuity
()	Questionable text
(())	Editorial insertion
-	Pause
NOTE:	All times are expressed in Central Daylight Savings Time. Only radio transmission to and from the accident aircraft were transcribed.

INTRA-COCKPIT

TIME & SOURCE	CONTENT
1250:30	((Start of Recording))
1250:37	
CAM-3	* setenta
TCAM-3	* seventy
1250:44	
CAM-3	la velocidad
TCAM-3	the speed

AIR-GROUND COMMUNICATION

TIME & SOURCE	CONTENT
1250:32	
APP	TACA One ten wilco fly heading two niner zero vector around the thunderstorm off your right
1250:38	
RDO-1	okay two niner zero on the heading
1250:40	
APP	That's correct sir TACA one ten understand you do have an engine back
1250:45	
RDO-1	yes sir
1250:47	
APP	Alright sir maintain ah five thousand if you're able TACA one ten

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1250:48 CAM-2	velocidad		
TCAM-2	speed		
1250:51 CAM-3	Ahi viene el otro ahi viene el otro		
TCAM-3	here comes the other one here comes the other one		
		1250:52 RDO-1	okay I will
1250:54 CAM-2	velocidad		
TCAM-2	speed		
1250:56 CAM-4	Ya agarro uno		
TCAM-4	one already caught		
1250:59 CAM-3	ahi viene ya el otro okay		
TCAM-3	here comes the other one okay		
1251:01 CAM-2	a las cuarenta y cinco da starter cutoff		
TCAM-2	at forty five it gives starter cut off		
1251:03 CAM-3	spin up este Mundo ya la estamos haciendo Mundo		
TCAM-3	spin up that's it Mundo we're already making it Mundo		

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1251:04 CAM-2	cinco mil te dijo		
TCAM-2	he said five thousand is good		
		1251:09 APP	TACA one ten turn right heading three one zero vector around the ah weather over
		1251:14 RDO-2	TACA one ten three one zero
		1251:17 APP	that's correct sir I'm vectoring to runway one nine at New Orleans International Airport the wind's two three zero at one zero you can have runway two eight also if like
1251:19 CAM-3	okay		
1251:23 CAM-3	ya tenes los dos		
TCAM-3	you already have both of them		
1251:24 CAM-1	esta bien		
TCAM-1	alright		
1251:25 CAM-3	you got it		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
		1251:26 RDO-2	okay sir we got both engines back now w really appreciated what you did for us we're going to ah three one zero heading and ah leaving four thousand
1251:33 CAM-1	mira yo no siento potencia por que no siento potecia		
TCAM-1	look I don't feel any power why don't I feel any power		
		1251:37 APP	TACA one ten roger if you're able maintain four thousand
1251:40 CAM-2	what do I do about without power		
1251:41 CAM-1	no yo no siento potencia en esta #		
TCAM-1	no I don't feel power in this # man		
1251:43 CAM-4	pone esto hombre		
TCAM-4	put this on		
		1251:45 RDO-2	four thousand
1251:47 CAM-1	no esta arrancando este		
TCAM-1	this # is not starting		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
CAM-3	ponle esto		
TCAM-3	hold on		
1251:50			
CAM-4	ponle esto dejalo en automitico		
TCAM-4	put this on leave it in automatic		
1251:52			
CAM-1	perdoname pero no esta arrancado		
TCAM-1	excuse me but it has not started		
CAM-3	el uno prueba el uno		
TCAM-3	number one try number one		
1251:55			
CAM-1	no tenemos nada decile que no tenemos nada que no tenemos nada		
TCAM-1	we've got nothing tell him we have nothing that we have nothing		
1251:56			
CAM-3	negative		
1251:59			
CAM-1	bueno donde lo pongo este #		
TCAM-1	okay where do I put the # down		
1252:00			
CAM-4	ahi esta otra vee ahi esta		
TCAM-4	there it is again that's it		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
		1252:01 APP	TACA one ten New Orleans Approach your choice of runways the wind is two three zero at niner New Orleans International there is a storm weather east of the airport approximately seven miles would you like to go to runway one nine or runway two eight your choice
1252:04			
CAM-4	ahi va ya ahi va ya		
TCAM-4	there it goes there it goes		
CAM-2	*		
1252:07			
CAM-3	dejalo dejalo dejalo		
TCAM-3	leave it leave it leave it		
1252:09			
CAM-2	ahi va el solo		
TCAM-2	there it goes on its own		
1252:11			
CAM-1	decile que no tenemos nada		
TCAM-1	tell him we have nothing		
1252:13			
CAM-5	* necesitan algo -- * cabina de pasajeros *		
TCAM-5	* do we need to do anything --- * passenger cabin **		

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1252:15 CAM-1	decile que no tenemos ni # que no tenemos nada		
TCAM-1	tell him that we ain't got # that we have nothing		
1252:16 CAM-4	cierra la puerta*		
TCAM-4	close the door *		
1252:17 CAM-3	fuera Mundo		
TCAM-3	go outside Mundo		
		1252:19 RDO-2	we ah don't have any power on the engines
1252:24 CAM-1	#		
CAM-?	*		
		1252:26 APP	TACA one ten I'm gunna vector ya to runway one eight at Lake Front airport would you prefer you're closer to the Lake Front airport you're only about eleven miles away from Lake Front
1252:33 CAM-2	okay go ahead		

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INTRA-COCKPIT TIME & SOURCE	INTRA-COCKPIT CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	AIR-GROUND COMMUNICATION CONTENT
		1252:36 RDO-1	okay I I don't think that I will make i ah I I don't have any power on the engine we have rainings all over but we don't have any power on the engines here sir so I guess that we have to go down we have to go down ah we declare emergency we are going to decide where to put this thing over
1252:40 CAM	((sound of landing gear warning horn))		
		1252:57 APP	TACA one ten understand you are descending you have no power on the engines roger
1252:56 CAM	((sound of landing gear warning horn))		
1252:58 CAM-3	esperate por esto hombre		
TCAM-3	wait wait because of this man		
		1253:01 RDO-1	okay we're gunna decide to put her here ah what is a little bit best for you guys
1253:06 CAM-?	huh		

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1253:07 CAM	((sound of landing gear warning horn))		
1253:08 CAM-1	vaya dame esto		
TCAM-1	okay give me this		
		1253:09 APP	TACA one ten do you have visual reference to the ground at this time
1253:10 CAM-2	ponelo lo mas suave posible		
TCAM-2	put it down as softly as possible		
1253:14 CAM-2	yes		
		1253:15 RDO-1	yes sir
1253:17 CAM-3	estan a cinco		
TCAM-3	there on five		

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
		1253:21 APP	TACA one ten there's the interstate highway directly ahead of you at twelve o'clock and six miles
		1253:28 RDO-1	okay and let's see where where is it
		1253:31 APP	that is the interstate highway interstate ten that runs northeast southwest presently you're over the water over lake Borgnen
		1253:40 RDO-1	yes sir I don't believe we are gunna be able to make it there sir
1253:45 CAM-2	alla te dice el # desues de la		
TCAM-2	the # is telling you it's after that		
1253:48 CAM-1	si		
TCAM-1	yes		
		1253:50 APP	TACA one ten you're seven miles away from the Lake Front airport seven miles away landing at Lake Front airport can you make it there

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1253:55 CAM	((sound of landing gear warning horn))		
		1253:57 RDO-2	no sir we're at two thousand feet and we're losing altitude at ah one hundred and fifty I guess I gunna have to make a ditching here sir
		1254:05 APP	okay TACA one ten there's a interstate highway directly ahead of you I suggest that if you have to go down do not go straight ahead you'll run right into ah traffic on the ground
		1254:17 RDO-1	okay wherever well the only thing I can do right now is to make a three sixty here - and land over the water sir
1254:22 CAM-2	mira mira y aquel bolado ahi pues		
TCAM-2	look look and that one over there		
		1254:24 APP	TACA one ten roger whatever you need to do sir

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1254:26 CAM-1	lo sampamos alli en la grama		
TCAM-1	do we go in there on the grass		
1254:29 CAM-2	si hombre		
TCAM-2	yes man		
CAM-1	huh		
CAM-2	si hombre		
TCAM-2	yes man		
1254:31 CAM-3	esperate un momento esperate un momento seguir tratando		
TCAM-3	wait a moment wait a moment we got to keep on trying		
		1754:32 APP	TACA one ten the altimeter at New Orleans two niner niner zero the wind two zero zero at niner
1254:37 CAM-1	preparen cabina apurese apurese		
TCAM-1	prepare cabin come on come on		
1254:39 CAM-2	vamonos alli vamanos		
TCAM-2	let's go over there let's go		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1254:40			
CAM-5	pero queres que abra -		
TCAM-5	but do you want us to open -		
1254:42			
CAM-2	alli nos vamos a meter		
TCAM-2	that's where we are going to go in		
1254:43			
CAM-1	you got it baby		
1254:44			
CAM-2	okay		
1254:45			
CAM-3	como lo sentis		
TCAM-3	you got it - no got it- how do you feel it		
1254:47			
CAM-1	se cae mira se cae		
TCAM-1	it falls down look it falls down		
CAM-2	alli ve alli ve		
TCAM-2	there look there look		
1254:48			
CAM-1	ve saca el tren y todo pues		
TCAM-1	okay put the gear down and everything		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
CAM-3	no tiene tren		
TCAM-3	you got no gear		
CAM-1	vos tiralo este #		
TCAM-1	you get that # down		
1254:50 CAM	((sound of landing gear being lowered))		
1254:54 CAM-1	vamos flaps		
TCAM-1	come on flaps		
		1254:54 APP	TACA one ten I show your altitude now seven hundred feet
1254:55 GPWS	sink rate sink rate sink rate		
1254:58 CAM	((sound of trim in motion))		
1254:59 GPWS	minimums minimums		
1255:01 CAM-3	tenemos tren		
TCAM-3	we got the gear		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1255:02			
CAM-3	es un borde # mejor al agua		
TCAM-3	and it's a hump # better on the water-		
CAM-1	no hombre aqui ponlo		
TCAM-1	no man we'll put it here		
1255:04			
GPWS	too low flaps		
CAM-1	full flaps		
1255:06			
GPWS	too low flaps		
CAM-1	va agarrate papa		
TCAM-1	alright come on hold on		
1255:08			
CAM-3	okay		
1255:10			
CAM-2	aqui de lado a la derecha		
TCAM-2	over here to the right		
1255:12			
GPWS	sink rate		
1255:13			
GPWS	sink rate		

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INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1255:14			
CAM-1	aqui fue		
TCAM-1	this is it		
1255:17			
CAM-2	cuidado con el ala de aquel lado		
TCAM-2	watch out for the wing on that side		
CAM-1	ah de a ver		
TCAM-1	I see it		
1255:19			
CAM	((sound of touchdown))		
1255:20			
CAM-2	muy bien muy bien		
TCAM-2	very good very good		
1255:29			
CAM	((sound of laugh))		
1255:31			
CAM-2	y que no fuimos fumigadores #		
TCAM-2	and weren't we crop dusters you's #		
1255:33			
CAM-3	muy bien Charlie muy bien muy bien Charlie muy bien		
TCAM-3	very good Charlie very good very good Charlie very good		
1255:36			
CAM-2	y que no fuimos fumigadores		
TCAM-2	and weren't we crop dusters		

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INTRA-COCKPIT		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
1255:37			
CAM-3	y ahora vamos a hacer un emergency evacuation o no		
TCAM-3	and now are we going to do an emergency evacuation or not		
1255:40			
CAM-1	vaya salgan salgan todsa la gente salga todsa la gente		
TCAM-1	now get every body out get every body out		
1255:42			
CAM-2	tranquilo tranquilo		
TCAM-2	calm down calm down		
1255:44			
CAM	((noise associated with aircraft moving stops))		
1255:45			
CAM-3	tranquilo		
TCAM-3	calm down		
1255:46			
CAM-1	como no sacala porque si no dicen estos gringos		
TCAM-1	no get every body out because otherwise these gringos are going to start saying things		
CAM-1	evacuacion		
TCAM-1	evacuation		

INTRA-COCKPIT TIME & SOURCE	CONTENT	AIR-GROUND COMMUNICATION TIME & SOURCE	CONTENT
1255:48			
CAM-1	hey evacuen por favor evacuen por favor		
TCAM-1	hey evacuate please evacuate please evacuate		
1255:50			
CAM-5	abran los puertas por favor		
TCAM-5	open the doors please		
1255:51			
CAM-1	si dele tirela		
TCAM-1	yes go ahead		
1255:53			
CAM-2	dejamos los flaps abajo		
TCAM-2	do you want the flaps down		
1255:54			
CAM-1	si senor todo		
TCAM-1	yes sir all of it		
1255:56			
CAM-2	los spoiler quitalos		
TCAM-2	take down the spoilers		
1255:58			
CAM	((sound of evacuation slide inflating))		
1255:59			
CAM	((sound of evacuation slide inflating))		
1256:01	((end of transcript))		

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ATC Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D. C. 20594

September 13, 1988

AIR TRAFFIC CONTROL GROUP CHAIRMAN'S FACTUAL REPORT

A. ACCIDENT

Location:	New Orleans, Louisiana
NTSB No:	FTW-88-MA-109
Aircraft:	Boeing 737-300, TACA Flight 110
Date:	May 24, 1988, 1741 UTC (1241 CDT) 1/
Facility:	New Orleans Approach Control Houston Air Route Traffic Control Center

B. Air Traffic Control Group

Chairman:	Allen E. Lebo National Transportation Safety Board
Members:	Barbara Allgood, Operations Officer, New Orleans Tower
	Capt. Donald P. Scott, TACA (Central American Air Transport, SA)

C. SUMMARY

On May 24, 1988, at about 1256 Central Daylight Time, TACA International Airlines, S.A., Flight 110, a Boeing 737-300, made a forced landing on an unimproved, grass field in New Orleans, Louisiana following the loss of power from both engines at about 16,500 feet. TACA 110 was in voice communication with with New Orleans Tracon when the incident occurred. Recorded radar data indicated a loss of transponder return beginning at 1243:46Z until 1246:45Z.

1/ Times that are expressed in Universal Coordinated Time (UTC) will have the letter Z after the time. All other times will be in ~~Mountain Standard Time~~.

D. Details of Investigation

1. History of Flight

TACA110 contacted Houston Air Route Traffic Control Center, Ocean/Offshore Radar at 1704Z, reported level at FL350, and estimated "Dolph" at 1732Z. At 1722Z the controller informed the flight that they were in radar contact 120 miles south of Leeville. About 1 1/2 minutes later TACA110 was told to contact Houston Center on 133.85, which is the Leeville radar sector.

When TACA110 contacted the Leeville radar controller at 1724:19Z, it was instructed to descend at pilot's discretion to maintain one one thousand, was issued the New Orleans altimeter of 29.91, and was "...cleared to deviate as necessary, recommend an easterly heading." The pilot repeated, "Pilot's discretion eleven thousand, 29.91 and uh cleared to Moisant." The controller then replied, "TACA110 roger turn five degrees right and that should get you around most of the weather." TACA110 then acknowledged.

At 1731:06 the Leeville Radar Controller told TACA110 to "maintain one one thousand, begin descent now please." TACA110 did not respond and then 18 seconds later the instruction was again repeated. The flight then acknowledged the clearance and reported leaving flight level 350. At 1740:00 TACA110 was told to contact New Orleans Approach on 123.85.

TACA110 contacted New Orleans Approach Control at 1740:24 out of "190." At 1740:42, the approach controller transmitted, "TACA 110 roger, vectors runway two eight final approach course continue inbound descend at pilots discretion maintain four thousand." Several seconds later approach control again transmitted, "...deviation around weather is approved, descend to four thousand, vectors for the ILS runway two eight approach." TACA110 repeated, " ...four thousand and deviation by weather is approved and uh we're leaving right now out of ah nineteen oh."

Beginning at 1744:39Z until the transmission at 1745:58Z, the approach controller made several transmissions to TACA110, but received no replies. At 1746:05Z, TACA110 transmitted, "Mayday Mayday TACA110 we still out of uh twelve thousand and we're in the middle of the storm sir." The controller asked how they heard approach control and TACA 110 replied, "...We need vectors to the runway right now sir, we lost an engine, we got only one engine." The controller asked them to say altitude, and at 1746:33, the flight reported leaving "eleven thousand." The controller then assigned the flight a heading of 010 degrees.

At 1747:15Z, the controller again told the flight to turn left to a heading of 110, and then asked, "...understand you have lost an engine, is that correct?" TACA110 replied, "...both engines."

The controller then said that he would give them vectors to Navy Callender, runway 22 final approach. He told the flight to turn left to a heading of 340. TACA110 repeated the heading.

At 1748:20Z, the controller told the flight that they were being vectored to the closest airport, which was Navy Callender, but that there was thunderstorm activity over the Navy Callender airport "...at this time off your left I'm vectoring you to the field." TACA110 replied that they were heading 340 and were "out of eight thousand." The controller then assigned a heading of 280 to the flight. They reported that "...we have a thunderstrom right here sir...I don't have both engines running...we're at 7500 ft...I'm declaring an emergency...trying to restart the engines. The controller, at 1749:05Z, replied, "...remain in the clear, fly heading of 010 then." TACA110 reported, "...gliding down...."

At 1749:26Z the controller told TACA110 that the nearest airport was 15 miles southwest of its present position. The controller then told the flight to turn left when able heading 280.

At 1750:21Z the controller informed TACA110 that it was 17 miles from the airport, runway 22 at Navy Callender. TACA110 then replied that it had one engine back and that it was requesting a vector to New Orleans. The controller replied, "Wilco" and assigned a heading of 290 as a vector around "...the thunderstorm off your right." The controller then confirmed that they had an engine back, and told the flight to maintain five thousand "if you're able."

At 1751:17 the controller then said that he was vectoring the flight to runway 19 at New Orleans International Airport, issued the winds as 230 at 10, and said that they could also have runway 28 if they liked. TACA110 then said, "...sir, we got both engines back now we really appreciated what you did for us we are going to 310 heading and leaving 4,000." The controller then said to maintain 4 thousand if able.

At 1752:18 TACA110 reported that it didn't have any power on the engines. The controller replied that he was going to vector the flight to runway 18 at Lakefront Airport, that the flight at this time was only 11 miles away from Lakefront.

At 1752:34 TACA110 said "...I don't think that I will make it...I don"t have any power...we have to go down...we declare emergency...." At 1753 TACA110 asked, "...where will be the best for you guys?" The controller ask if they had visual reference to the ground, and the flight replied that it did. The controller then stated that there was an interstate highway

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directly ahead at twelve o'clock and six miles, that the highway was interstate ten which runs northeast southwest. He then told TACA110 that it was "...presently ...over the water over Lake Borgne." TACA110 reported that it was not going to be able "...to make it there sir." The controller then told the flight that it was 7 miles from the Lakefront Airport, and asked if they could make it there. TACA110 replied, "No sir, we're at two thousand and we're loosing altitude uh hundred and fifty I guess I got to make a ditching here sir."

At 1754:03Z the controller said, "OK TACA110 there's an interstate highway directly ahead of you I suggest that you have to go down, do not go straight ahead, you'll run right into traffic on the ground." TACA110 said, "...well the only thing I do right now is make a three sixty here I'll land over the water, sir." The controller replied, "whatever you need to do sir," and then issued the New Orleans altimeter and the wind which was 200 at 9 knots. At 1754:51 the controller transmitted, "...I show your altitude now seven hundred feet."

At 1800:39Z the approach controller transmitted to another aircraft, N2KA, "...if you could for me sir, check to your east and just slightly to the south about three to four miles we lost an aircraft down there a seven thirty seven and if you can pick it up let me know what you see." The controller and pilot exchanged some more information, and then at 1801:37 the aircraft reported that they "...see one on this grass strip down here by the river." The pilot then reported that it looked like a Boeing 737 with the chutes out. Then at 1802:26 N2KA reported, "OK we see the chutes are open and about four or five vehicles or a whole bunch of vehicles screaming, streaming out there now, and ah that's about what we can see a bunch of cars going out there right now." The controller then expressed concern about the aircraft being on a highway, and N2KA reported that it was "...on one of these embankments its intact." The controller inquired if there was any smoke or fire, and N2KA said that it looked OK "...like he did a pretty good job on it." The controller then said, "OK so its on, on the levee." N2KA said, "Affirmative, looks right on the side of the levee and everything looks intact. There's a bunch of people standing about a hundred yards away from the airplane around an ambulance, but other than that it looks OK."

2. Interview Summary

Mr. Benny Dale Allen was the Supervisor in the Tracon at the time that the incident occurred. He had had 4 years experience in the Marine Corps as a controller, and then in 1973 began employment with the FAA as a controller at Shreveport, La. In 1974 he went to Baton Rouge Tower, in '76 went to New Orleans, in '78 went to Houston Intercontinental, and then in 1981 returned to New Orleans as a Supervisor.

As a result of questions, Mr. Allen indicated the following:

-Their airspace extends from the surface to 15,000 feet, roughly 40-45 miles from the airport, and surface to 10,000 feet to the West.

-He watched the desk for the day supervisor until about 11:30 am, and then went to lunch. When he returned from lunch, he returned to the watch desk. As he recalled, the incident happened at about 12:55 pm local time.

-When he began work that day which was at about 10:00 am, the weather was VFR.

-Thunderstorms were building about 15 - 20 miles to the southwest.

-A discussion he had had with a meterologist at the Center had been on the GP382 line.

-The radar system was in Linear Polarization.

-There are 5 positions of operation in the facility, with 2 having been operational prior to and during the occurrence.

-The position that the incident occurred at was the North Radar Position, which was actually the North Radar and the South Radar Positions combined. That position transmits and receives on 123.85, 120.6, 124.45, and 118.1, 124.45, and 118.1.

They had gotten a Sigmet and a CWA over the "F DEP." The flight data specialist puts it on SAIDS (Systems Atlanta Information Display System), which has 8 pages.

When he had gone to lunch, he had left a controller in charge. She was not working a position during this time, but was "watching the desk."

-When he returned from eating, the controller was trying to turn the aircraft to the Navy base. The controller that he had left in charge was "on the line" to the Navy Tower.

-He called the Coast Guard on the phone. He then recalled that the pilot had said that they'd had a restart, and he told the Coast Guard to stand by. He again notified the Coast Guard that the aircraft was east of Lake Front.

-Precipitation depicted on the radar display was a northeast - southeast line from about 10 miles northeast of Harvey VOR extending southwest to Tibley VOR. The area was about 10 miles wide.

-There were some other small precipitation areas depicted to the west.

-The main storm had developed to the southwest and moved to the east - northeast.

-He didn't know of anybody that had gone through that particular precipitation area prior to TACA.

-At the time of the occurrence, he had no idea what the VIP Levels were of the storms that were on his display.

Miss Rosalind Marie Robertson, a flight data assistant, was working the flight data position when the incident occurred. She said that she had been employed as an air traffic assistant for about 1 year and 4 months, her EOD date being in January of 1986. As a result of questions she indicated the following:

-Her scheduled shift had been from 9:30 - 5:30.

-She was in the radar room from 40 minutes prior to the accident until the time of the accident.

-During the day of the accident, prior to the accident she remembered having received both sigmets and weather alerts. She also remembered calling this information to "Navy, Lake Front, and Homer on the land line, and then putting it on the SAIDS."

Mr. Joel Hurwitz was working the north radar position of the New Orleans Approach Control when the incident occurred. He started with the FAA as an air traffic controller at Orlando in 1967, and was there for a "very short time." He then went to Opa Locka Tower for 3 years, and after this came to New Orleans Tower. Prior to this he was a controller in the Navy. His facility operating initials were "JH." The date of his last physical was 9/14/87, his last over-the-shoulder evaluation was 5/9/88, and his last tape talk was 1/5/88. As a result of questions, Mr. Joel Hurwitz indicated the following:

-The day that the incident occurred was the 5th day of a 5-day workweek.

-He has not worked overtime for at least a year.

-His scheduled shift the day that the incident occurred was from 7:00 AM to 3:00 PM. He started at 6:30 ~~PM~~.
AM

-Prior to starting at the North Radar Position, he had been on a break. He started on this position about 45 minutes before the incident.

-From the time that he began on that position to the time that the incident occurred, he described the traffic and workload as "very light."

-There were precipitation returns to the west and to the southwest of the airport, moving slowly to the north and east. There was precip displayed around the Navy Base.

-He recalled having received a "weather warning."

-He couldn't recall the exact number of the VIP level in that warning.

-He had not worked any other aircraft through the area that TACA had flown. "...He is about the only aircraft that comes that way."

-He didn't recall where his MTI had been set, but he said that is was "OK," and that the scope looked generally good. He had 10-mile range rings displayed, with the range being "out far enough to accept a hand-off."

-The main part of the precepitation return was to the southwest of New Orleans in the vicinity of Navy Callendar.

-In recalling the incident, he believed that TACA came into the precip to the south of Navy Callendar.

-He couldn't recall if the radar system was in circular or linear polarization.

-From approximately the initial return on the flight track depiction used in the interview, it was his intention to have TACA turn west and go to Navy Callendar.

-TACA wouldn't turn (reference the 110 degree comment in the transcript.) He then changed maps to the VFR overlay, and yelled out, "got a problem."

-On the relief briefing, no comments had been made about the weather to the south.

-He also had received no complaints or comments from any pilots regarding the weather.

-He normally checks the SAIDS unit when he sits down, but couldn't recall what had been displayed.

Mr. Donald J. Boudousquie was working TACA during the time period when TACA was in radar contact with the Houston ARTCC, except when the frequency change to approach control was issued. At this point he had been relieved. During his interview he was asked to draw a sketch of the aircraft's path and his recall of the depicted weather areas on his display at the time. That sketch is included as an attachment labeled "weather sketch."

His FAA EOD date was 4/8/57. Prior to this he had been a Control Tower Operator in the military. His operating Initials were BB. His most recent medical certificate was dated 9/15/87. He had worked at the New Orleans ARTCC from 4/8/57 until 6/65, and he has been at Houston ARTCC since 6/20/65 until the present. As a result of questions, he indicated the following:

-He started to work at 7:40 AM the morning that the incident occurred.

-The sector that he worked TACA110 in was called the Leeville Sector, transmitting and receiving on 133.85.

-He was on the Sector about 35 minutes prior to TACA110 coming on the frequency.

-He thought that his display was set on 150 miles range.

-There were H's depicted to the southwest of New Orleans. He also recalled that there were additional H's depicted 60-80 miles SW of New Orleans.

-Aircraft were deviating 100 to 120 miles SE of New Orleans. A couple of Continental Aircraft eastbound on J86 had deviated to the south. He could not see what they were deviating around.

-The turn he issued to TACA110 would have taken the flight 10 - 15 miles east of Leville VOR, clear of any depicted areas of weather which were further north.

-He had both lines and H's displayed.

-He did not believe that the narrow band depicted weather as well as the Broad Band did.

-Most of the H's were on the West side of the western area which he depicted on the hand-drawn map. Aircraft were going east-bound through these H's.

-All of the weather was to the west of the MSY 171 degree radial.

-He has been working in the same area of specialization in the Center since 1957.

-The majority of the time, the weather "picture" given by the WSU coincides with the Weather depicted on the display.

-He felt that it was very helpful to know the VIP levels of a thunderstorn.

-The particular concept that he had during the time period under investigation was that the weather depicted on his display had VIP levels that were no higher than 3's or 4's.

Mr. Doug Spencer was the controller that had relieved Mr. Boudousquie. Mr. Spencer had simply issued the frequency change for TACA110 to contact approach control. During the field phase of the investigation, Mr. Spencer was off duty on his scheduled days off and could not be located. Because of his minimal contact with TACA110, the Air Traffic Group decided to have the facility ask Mr. Spencer to draw a diagram or map of what he recalled as the flight track and the depicted weather on the radar display. This "sketch" is included as an attachment. He was on duty in the facility from 12:40 to 20:40Z, and was working the radar position from 17:33 to 18:22Z when he issued the frequency change to TACA110.

[redacted]

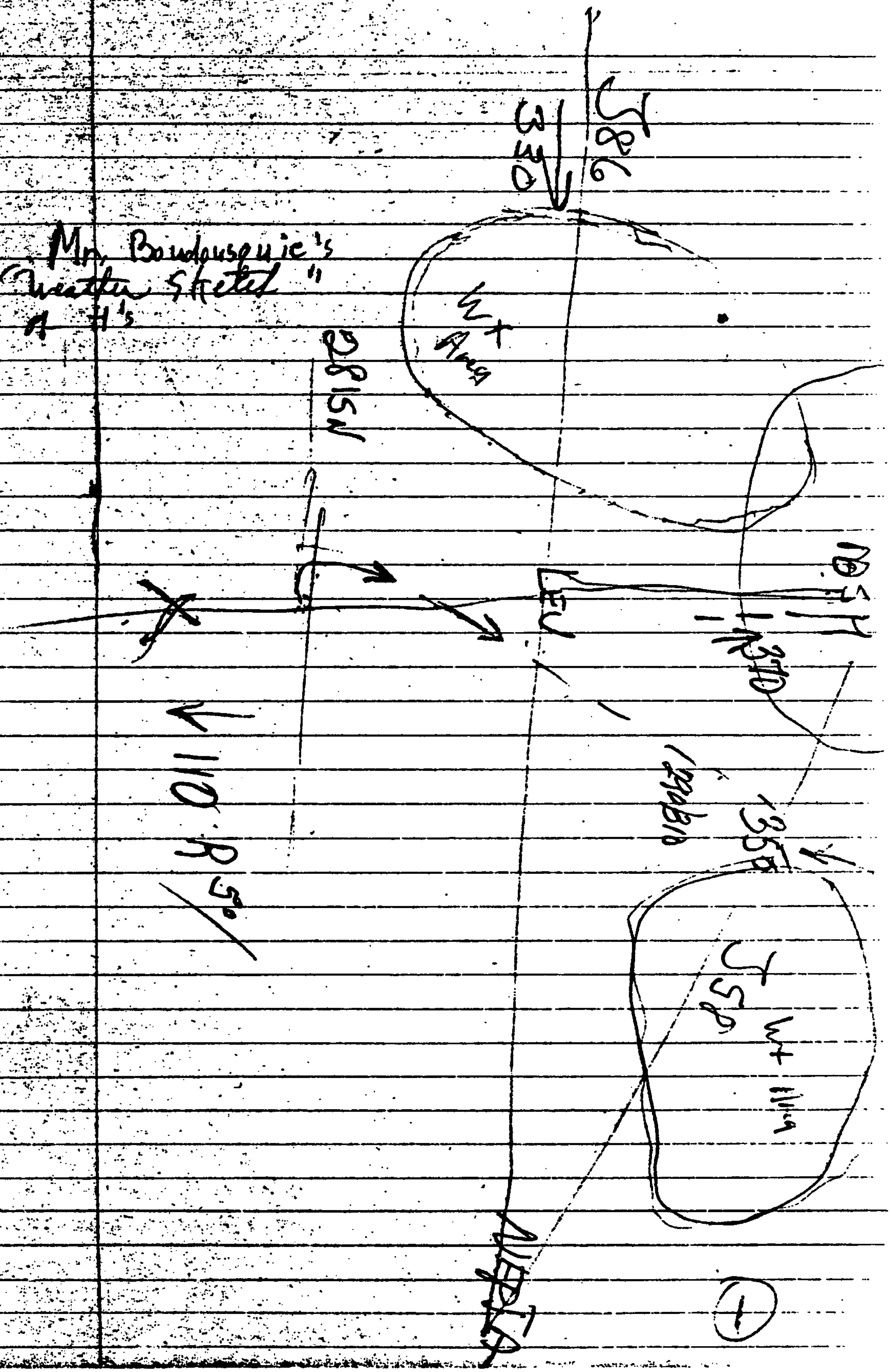
Allen E. Lebo
Air Safety Investigator

ATTACHMENTS

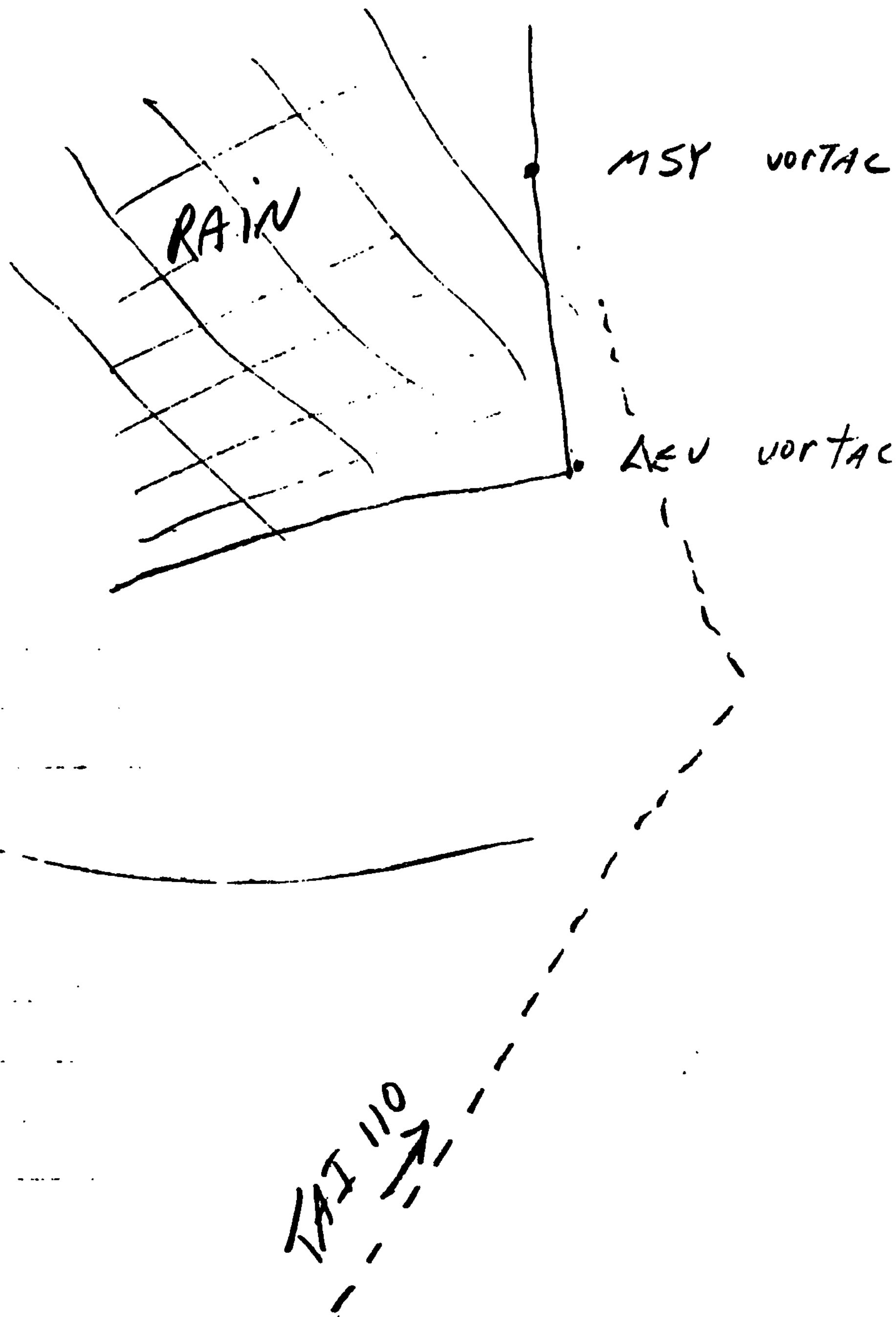
The following items should be considered to be attachments to the Air Traffic Control Report:

1. Mr. Boudousque's weather sketch, page 1.
2. Mr. Doug Spencer's weather sketch, page 2.
3. Transcript, Houston ARTCC., pages 2A - 23.
4. Transcript, New Orleans Approach Control pages 24 - 38.
5. FAA Form 8020-6 Report of Acft. Accident page 39.
6. FAA Form 8020-3 ...Notification Record, page 40.
7. FAA Form 7230-4 Daily Record of Facility Operation, page 41.
8. Position Log page 42.
9. Flight Progress Strip, page 43
10. Weather Information, page 44.
11. Tracon Layout, page 45.
12. Letter of Agreement, pages 46 to 51.

Mr. Boudousquie's
"Weather Sketch"
A H's



Below is a map showing the weather and TAI 110 Route of flight on May 24, 1988.



There were returns from rain in the southwest quadrant
f the MSY vortac, TAI 110 deviated to the East until
He was about 30 miles southeast of the LEV vorta
d Then went direct MSY.

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U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Houston ARTC Center
16600 John F. Kennedy Boulevard
Houston, Texas 77032

Subject: Transcription Concerning the Accident To TAI11Ø Boeing 737 on May 24, 1988, at 1755 UTC

Date: June 2Ø, 1988

From: Walter A. Metzger
Air Traffic Manager, Houston Center

Reply to Attn of:

To: This transcription covers the time period from May 24, 1988, 1659:ØØ to May 24, 1988, 1746:ØØ UTC.

Agencies Making Transmissions	Abbreviation
Houston Air Route Traffic Control Center Ocean/Offshore Radar	OAC-R
Houston Air Route Traffic Control Center Ocean/Offshore Manual	OAC-D
Houston Air Route Traffic Control Center Leeville Radar	LEV-R
Houston Air Route Traffic Control Center Beaumont Radar	BPT-R
Monterrey Center	MEX
Houston Air Route Traffic Control Center McComb Radar	MCB-R
Jacksonville Air Route Traffic Control Center Nepta Sector	JAX
Unknown	Unknown
TACA Airlines Flight One Ten	TAI11Ø
United Airlines Flight Forty-Five	UAL45
Continental Airlines Flight Eleven Thirty	COA113Ø
Continental Airlines Flight Five Seventy-Three	COA573

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2A

Continental Airlines Flight Five Thirty-Six	COA536
American Airlines Flight Six Eighty	AAL680
Mexicana Airlines Flight Eight Twenty-One	MXA821
RHET Two Three	RHET23
November One Four Three Delta Alfa	N143DA
OPEC Two Three	OPEC23
Mexicana Airlines Flight Seven Eighty-One	MXA781
Continental Airlines Flight Four Ninety	COA490
Mexicana Airlines Flight Eight Seventeen	MXA817
Continental Airlines Flight Ten Thirty-One	COA1031
Continental Airlines Flight Seventeen Ninety-Nine	COA1799
Delta Airlines Flight Eight Fifty-Seven	DAL857

I hereby certify that the following is a true transcription of the recorded conversation pertaining to the subject aircraft accident:

[redacted]

D. B. Raskey, Jr
ATA

(1659)

1659:31	UAL45	Houston United forty-five is uh out of thirty four for thirty-three
1659:38	OAC-R	United forty-five Houston Center roger when able request Sword estimate please
1659:48	UAL45	OK seventeen thirty-two for Sword United forty-five and is flight level three seven oh available
1659:57	OAC-R	Affirmative stand by
1700:00	UAL45	Well we like to try up there please
1700:44	OAC-R	United forty-five climb and maintain flight level three seven zero
1700:48	UAL45	OK climb and maintain flight level three seven oh United forty-five
(1701)		
1701:15	OAC-R	Attention all aircraft convective SIGMET two central valid until one eight five five Zulu from five zero miles southeast of New Orleans niner zero miles south of Crestview one two zero miles southeast of New Orleans one one zero miles south southeast of New Orleans five zero miles south of New Orleans correction southeast of New Orleans area of thunderstorms moving east at three five knots tops flight level four zero zero
(1702)		
(1703)		
1703:06	COA1130	Houston Center Continental eleven thirty
1703:09	OAC-R	Continental eleven thirty go ahead
1703:13	OAC-R	Continental eleven thirty go ahead
1703:16	COA1130	Eleven thirty uh estimate (unintelligible) one seven zero one flight level three three zero (unintelligible) estimating Lulis one seven zero nine
1703:22	COA573	Houston Continental five seven three two eight zero for two niner zero.

1703:27	OAC-R	Continental eleven thirty roger squawk two four five seven please
1703:31	COA1130	Two four five seven roger
1703:36	OAC-R	Center to Continental five seventy-three go ahead
1703:40	COA573	Yeah we're out of twenty-eight three for two niner zero
1703:45	OAC-R	Continental five seventy-three roger
1703:51	COA536	Houston Continental five thirty-six
1703:55	OAC-R	Continental five thirty-six go ahead
1703:57	COA536	Yes sir Continental uh five thirty-six at Barow at the zero three three seven zero we're estimating Brims one seven Grand Isle
(1704)		
1704:08	OAC-R	Roger
1704:10	AAL680	American six eighty with you uh over Barow at uh oh three Earns one six three one oh
1704:19	OAC-R	American six eighty radar contact one mile northwest of Barow
1704:23	AAL680	Thank you sir
1704:26	TAI110	Houston Center good morning TACA one ten
1704:32	OAC-R	TACA one ten squawk two five five seven go ahead
1704:39	TAI110	Thank you sir two five five seven level three five oh estimated Dolph seventeen thirty-two Zulu
1704:47	OAC-R	TACA one ten roger
(1705)		
1705:34	OAC-R	Ocean offshore
1705:35	LEV-R	Ocean Mexicana eight twenty-one
1705:37	OAC-R	Go ahead

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(5)

1705:38	LEV-R	He's still requesting Amber four I'll let you have control of the aircraft OK
1705:42	OAC-R	Thank you Z I
1705:43	LEV-R	B B
(1706)		
1706:13	MXA821	Uh Houston Mexicana eight twenty-one flight level three five zero and (unintelligible) Grand Isle Amber four to Tampico
1706:17	RHET23	Houston Center RHET two three flight request
1706:29	OAC-R	Mexicana eight twenty-one Houston Center one roger stand by sir
1706:39	RHET23	Houston Center RHET two three flight request climb to block three three three five to avoid weather
1706:50	OAC-R	RHET two three I'll be unable I have crossing traffic at flight level three three zero and three five zero sir
(1707)		
1707:01	RHET23	Houston Center RHET two three would like to do a right three sixty present position to avoid weather
1707:08	OAC-R	RHET two three cleared as requested
1707:12	RHET23	RHET two three
(1708)		
1708:24	OAC-R	RHET two three uh heavy flight Houston Center
1708:28	RHET23	Go ahead Houston you were broken RHET two three say again
1708:32	OAC-R	RHET two three heavy heavy flight I have flight level three one zero through three flight level three three zero available if that will help you
1708:39	RHET23	Three one to three three RHET RHET two three flight uh negative sir we'll stay where we are

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1708:45	OAC-R	RHET two three alright roger maintain flight level two seven zero through flight level two niner zero
1708:52	COA573	Houston Center Continental five seventy-three over
(1709)		
1709:03	OAC-R	Continental five seventy-three go ahead
1709:04	COA573	Yeah is two nine zero our final today
1709:06	OAC-R	Continental five seventy-three uh that's correct you have crossing traffic flight level three three zero and opposite direction at flight level three one zero
1709:12	COA573	Yeah we can take three seven oh today
1709:29	N143DA	Houston Center Citation one four three delta alfa over Barow one zero after estimating Earns at three zero flight level three five zero
1709:41	OAC-R	Citation one four three delta alfa roger
1709:46	RHET23	Houston Center RHET two three flight request
1709:49	OAC-R	RHET two three heavy flight stand by sir
1709:51	RHET23	RHET two three flight
1709:53	AAL680	American six eighty traffic one o'clock one zero miles opposite direction is a Continental seven twenty-seven flight level two niner zero
1710:00	AAL680	For American six eighty
1710:01	OAC-R	American six eighty affirmative
1710:03	AAL680	OK looking
1710:05	OAC-R	Continental five seventy-three traffic one o'clock one zero mile opposite direction is American seven twenty-seven flight level three one zero and we're working on your request for higher sir

1710:12	COA573	Five seven three roger
1710:13	OAC-R	Citation one four three delta alfa radar contact
1710:17	N143DA	Three delta alfa roger
1710:20	N143DA	Citation three delta alfa uh descending to flight level three one zero
1710:33	OAC-R	Continental five seventy-three to give you flight level three seven zero sir I'd have to give you a left three hundred sixty degree turn would you be able to accept that still want the climb
1710:40	OAC573	No we'll go two nine zero
1710:43	OAC-R	Continental five seventy-three (unintelligible).
1710:44	COA1130	Houston Continental eleven thirty
1710:49	OAC-R	Continental eleven thirty go ahead
1710:51	COA1130	Eleven thirty Lulis at uh one seven zero nine flight level three three oh estimating Barow one seven two eight Brims is next
1711:00	OAC-R	Continental eleven thirty roger
1711:15	OAC-R	RHET two three heavy flight go ahead sir
1711:17	RHET23	Yes sir our receiver at the completion of this three sixty would like to climb to flight level three three zero direct Barksdale RHET two three would like to go to Leeville one eight three at seven one then Biloxi two two zero at three four and then flight plan route
1711:37	MXA821	Houston Mexicana eight twenty-one
1711:39	OAC-R	Mexicana eight twenty-one stand by one sir
1711:54	OAC-R	Uh RHET two three heavy uh OPEC two three heavy flight upon the termination of refueling and the end of Marsa cleared to the Barksdale Air Force Base via direct to maintain flight level three three zero and to squawk two two six six over

(1712)

1712:25	OAC-R	RHET two three heavy flight Houston
1712:27	RHET23	RHET two three flight go ahead
1712:3Ø	OAC-R	RHET two three heavy flight upon the uh termination of refueling and Marsa OPEC two three heavy flight cleared to the Barksdale Air Force Base via direct maintain flight level three three zero and to squawk two two six six and uh say your requested altitude sir
1712:52	RHET23	Houston RHET two three copy receiver's clearance of three three zero squawking two two six six waiting on clearance for RHET two three
1713:ØØ	OAC-R	RHET two three roger say requested altitude sir
1713:Ø4	RHET23	Two nine zero requested altitude for RHET two three sir
1713:Ø8	OAC-R	RHET two three heavy flight roger cleared uh OK to uh stand by.
1713:2Ø	OAC-R	RHET two three heavy flight uh upon the termination of Marsa cleared uh direct to the Leeville one eight three seventy-one direct to the Keesler two two zero at thirty-four maintain flight level two nine zero
1713:33	RHET23	Uh RHET two three copied all thank you very much Houston
1713:38	OAC-R	And RHET two three heavy flight uh squawk two zero seven four verify you're a flight two K C thirty-fives
1713:47	RHET23	That's affirmative RHET two three we'll squawk two zero seven four
1713:52	OAC-R	United forty-five radar service uh correction radar contact lost contact Merida Center one two eight point two at Sword

(1714)

1714:Ø2	UAL45	Contact Merida Center one two eight two at Sword United forty-five
1714:Ø5	RHET23	And Houston RHET two three correction

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1714:10	OAC-R	Continental five thirty-six ident
1714:14	N143DA	Houston Center Citation three delta alfa requesting flight level three one zero
1714:20	OAC-R	Citation one four three delta alfa descend and maintain flight level three one zero
1714:25	N143DA	Three delta alfa
1714:26	OAC-R	Continental five thirty-six radar contact one hundred miles southwest of Leeville contact Houston Center one three three point eight five good day
1714:33	COA536	Thirty-three eighty-five five thirty-six good day
1714:36	OAC-R	RHET two three heavy go ahead
1714:47	OAC-R	RHET two three heavy flight Houston Center go ahead
1714:51	RHET23	Houston you were cut out RHET two three go again
1714:53	OAC-R	Sir you had another request over
1714:55	RHET23	Uh negative sir we just wanted to inform you that our receiver is uh K C one (unintelligible)
(1715)		
1715:01	OPEC23	Center OPEC uh two three two three zero for three three zero
1715:07	OAC-R	Ocean
1715:08	LEV-R	Sounds good Mexicana seven eighty-one three seven zero your approval
1715:11	OAC-R	Approved C C
1715:12	LEV-R	B B
1715:17	OAC-R	OPEC two three heavy flight did you check in sir
1715:19	OPEC23	OPEC two three heavy sir yes sir out of twenty-seven five for three three zero direct Barksdale

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1715:25	OAC-R	OPEC two three heavy flight ident
1715:30	OPEC23	Sir OPEC two three single aircraft
1715:33	OAC-R	OK OPEC two three my mistake ident please sir
1715:40	OAC-R	OPEC two three heavy radar contact seventy miles south of Leeville
1715:44	OPEC23	Roger that sir requesting Victor freq
1715:58	OAC-R	American six eighty contact Houston Center one three three point eight good day
(1716)		
1716:04	AAL680	(Unintelligible) three three eight
1716:20	OPEC23	And Houston OPEC two three heavy requesting Victor frequency
1716:26	OAC-D	OPEC uh two three I'll be changing you to one three three point eight five just shortly stand by one
1716:33	OPEC23	OK
1716:42	OAC-D	RHET two three contact Houston Center one three three point eight or UHF two six nine point five
1716:42	OAC-R	Leeville
1716:43	LEV-R	Leeville
1716:44	OAC-R	(Unintelligible) OPEC two three heavy climbing to flight level three three zero your approval
1716:47	LEV-R	That is approved
1716:48	OAC-R	C C
1716:49	OPEC23	OK one thirty-three eighty-five for OPEC two three sir and RHET two three is giving you a holler
1716:53	LEV-R	Go ahead
1716:54	OAC-R	You said something else there

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1716:55	LEV-R	Yeah I'd rather him stopped at thirty-one
1716:55	OAC-D	Roger if you can get him have him contact them on the same frequency one three three point eight five or two six niner point zero
1716:58	OAC-R	Say again
1716:59	LEV-R	I'd rather OPEC stop at thirty-one
(1717)		
1717:Ø1	OAC-R	OK I'll have him stopped at thirty-one
1717:Ø2	LEV-R	And RHET two three he's going to twenty-nine right
1717:Ø2	OPEC23	OK
1717:Ø3	OAC-D	And that's two six
1717:Ø4	OPEC23	Zero for RHET two three
1717:Ø5	OAC-R	Right
1717:Ø5	Unknown	(Unintelligible)
1717:Ø6	LEV-R	OK
1717:Ø6	OAC-R	C C
1717:Ø7	LEV-R	B B
1717:Ø8	OAC-D	(Unintelligible) make it two six niner point five two six niner point five my mistake
1717:12	OPEC23	OK two six niner decimal five RHET two six niner decimal five
1717:16	OAC-R	OPEC two three heavy flight amend you altitude sir maintain flight level three one zero
1717:23	OPEC23	OK sir OPEC is out of thirty-two five at this time we'll go back down to three one oh
1717:27	OAC-R	OPEC two three heavy flight thank you sir contact Houston Center one three three point eight five good day

1717:33	OPEC23	We going to thirty-three eighty-five good day
1717:35	OAC-R	Continental five seventy-three radar service terminated monitor this frequency until Marte at Marte contact Merida Center one two five point eight
1717:44	Unknown	(Unintelligible)
1717:52	MXA781	(Unintelligible) Mexicana seven eighty-one level three seven zero
1717:56	OAC-R	Mexicana seven eighty-one Houston Center roger
(1718)		
1718:02	OAC-R	Mexicana eight two one Houston Center go ahead with your request sir
1718:06	MXA821	(Unintelligible) we are going to proceed as filed Mexicana eight twenty-one thank you
1718:12	OAC-R	And Mexicana eight two one understand your gonna proceed un to Mexico City via Amber forty-nine Pozarica then via Jet three niner
1718:19	MXA821	Yes sir that's affirmative
1718:21	OAC-R	Mexicana eight twenty-one roger thank you sir sorry it took so long to get back to you I was kinda busy
1718:38	MEX	Houston Oceanic Monterrey one active flight plan
1718:41	OAC-R	Call you right back
1718:43	MEX	Right
(1719)		
1719:20	BPT-R	Beaumont
1719:21	OAC-R	This is the Ocean Citation one four three delta alfa direct Galveston direct to Earns direct uh Gal direct Hobby your approval
1719:28	BPT-R	(Unintelligible)
1719:30	LEV-R	Ocean

1719:32	BPT-R	I'm gonna have to go over Gilco with him
1719:34	OAC-R	OK I'll see
1719:35	BPT-R	You can give him a heading for the Trinity zero eight five
1719:38	OAC-R	OK I'll do that then
1719:39	BPT-R	Thanks
1719:4Ø	OAC-R	C C
1719:4Ø	BPT-R	(Unintelligible)
1719:41	OAC-R	Citation one four three delta alfa do you have RNAV sir
1719:45	N143DA	Three delta alfa affirmative
1719:47	OAC-R	Citation one four three delta alfa roger cleared to the Houston Hobby Airport via direct Gilco intersection Gilco one arrival maintain flight level three five uh three one zero
1719:56	N143DA	(Unintelligible) understand Gilco intersection Gilco one arrival Hobby three delta alfa
(172Ø)		
172Ø:Ø5	OAC-R	Ocean
172Ø:Ø5	LEV-R	Ocean uh Continental eight seventy-two deviating south all aircraft be deviating south around that weather
172Ø:11	OAC-R	Which weather
172Ø:12	LEV-R	Which weather
172Ø:14	OAC-R	Yeah
172Ø:15	LEV-R	From right where the aircraft is right on right on J eighty-six and J fifty-eight
172Ø:19	OAC-R	OK
172Ø:19	LEV-R	Tops reported flight level four five zero

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1720:21	OAC-R	OK
1720:22	LEV-R	B B
1720:22	OAC-R	C C
1720:40	BPT-R	Beaumont
1720:41	OAC-R	Ocean again
1720:45	BPT-R	Go ahead
1720:46	OAC-R	That Citation three delta alfa is RNAV he's direct Gilco and the arrival
1720:48	BPT-R	Great thanks
1720:49	OAC-R	C C
1720:49	BPT-R	(Unintelligible)
(1721)		
1721:23	OAC-R	TACA one ten ident
1721:43	OAC-R	TACA one one zero Houston Center ident
1722:00	OAC-R	TACA one one zero contact uh radar contact one hundred twenty miles south of Leeville
1722:06	TAI110	Roger TACA one ten thank you
1722:15	OAC-R	Citation one four three delta alfa contact Houston Center one three three point eight have a good day
1722:19	N143DA	Thirty-three eight good day
(1723)		
1723:29	OAC-R	Ocean
1723:30	LEV-R	Ocean like to have control of TACA one one zero
1723:33	OAC-R	For what
1723:34	LEV-R	Descent
1723:35	OAC-R	TACA one one zero's your control for lower

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1723:36	LEV-R	B B
1723:36	OAC-R	C C
1723:42	OAC-R	TACA one one zero contact uh Houston Center one three three point eight five good day
1723:49	TAI110	One three three point eight five TACA one ten have a nice day
(1724).		
1724:19	TAI110	Houston uh good morning TACA one ten level three five oh
1724:23	LEV-R	TACA one ten Houston Center roger descend at pilot's discretion maintain one one thousand the New Orleans altimeter two nine nine one cleared to deviate as necessary recommend a eastly heading
1724:39	TAI110	Pilot's discretion uh eleven thousand two nine ninety-one and uh cleared to Moisant
1724:49	LEV-R	(Unintelligible) TACA one one zero roger turn five degrees right and that should get you around most the weather
1724:56	TAI110	OK sir thank you very much TACA one ten
(1725)		
1725:14	LEV-R	Ocean
1725:15	OAC-R	Stand by
1725:24	OAC-R	Ocean
1725:25	LEV-R	OK Continental ten thirty-one what altitude
1725:28	OAC-R	You have to call the D side (unintelligible)
1725:30	LEV-R	Bye
(1726)		
(1727)		
1727:37	LEV-R	Continental eight seventy-two contact Jacksonville Center one two seven point four five good day have a good one

1727:44	Unknown	Thank you
(1728)		
1728:Ø6	MCB-R	McComb
1728:Ø6	LEV-R	McComb verify point out on RHET two three going to uh Mobile high
1728:1Ø	MCB-R	RHET two three point out
1728:11	LEV-R	B B
1728:13	LEV-R	RHET two three contact Houston Center three two two point four or one three two point six
1728:21	OPEC23	OK one three two point six OPEC two three good day
1728:23	RHET23	RHET two three thank you
1728:53	COA49Ø	Hello Houston Continental four ninety checking in at three three zero
1728:57	LEV-R	Continental four ninety Houston Center roger
(1729)		
1729:14	COA536	Houston Continental five thirty-six
1729:17	LEV-R	Continental five thirty-six uh traffic twelve o'clock twenty miles southbound three five zero go ahead
1729:24	COA536	Sir we're headed uh straight at Semmes right now any chance uh direct direct Montgomery on Liberty
1729:28	LEV-R	Uh Continental five thirty-six cleared direct uh Montgomery right now
1729:32	COA536	Montgomery Continental five thirty-six
1729:37	Unknown	Passing through that area we just came through is just uh constant light chop uh not very heavy at all
1729:43	LEV-R	Roger roger

1729:45	OPEC23	And Center OPEC two three heavy is back with you uh three one oh I think I took someone else's frequency
1729:55	LEV-R	OPEC two three roger frequency three five three point niner three fifty-three nine or one three two point niner five
(1730)		
1730:05	OPEC23	OK you want OPEC two three on one three two niner five we're going now so long
1730:11	LEV-R	Roger
1730:21	MXA817	Houston Center good morning Mexicana eight one seven three three zero
1730:25	LEV-R	Mexicana eight seventeen Houston Center roger maintain flight level three three zero
1730:30	MXA817	Eight seventeen
(1731)		
1731:06	LEV-R	Taca triple uh correction TACA one one zero descent maintain one one thousand begin descent now please
1731:19	LEV-R	TACA one one zero Houston
1731:22	TAI110	Go ahead TACA one ten
1731:24	LEV-R	TACA one ten descent maintain one one thousand begin descent now
1731:29	TAI110	Roger leaving three five oh to one one thousand TACA one ten
1731:34	LEV-R	Continental ten thirty-one climb maintain flight level three seven zero
1731:39	COA1031	Uh ten thirty-one is out of uh three five for three seven zero
1731:42	LEV-R	Roger
(1732)		

(1733)

(1734)

(1735)

1735:14	LEV-R	Continental ten thirty-one contact Houston Center one three two point six five
1735:19	COA1Ø31	Three two six five Continental ten thirty-one good day
1735:21	LEV-R	Good day
(1736)		
(1737)		
1737:33	LEV-R	Continental five thirty-six contact Houston Center one three two point six
1737:39	COA536	Thirty-two six Continental five thirty-six we'll see you
1737:42	LEV-R	Good day
(1738)		
1738:24	COA49Ø	Center Continental four ninety
1738:26	LEV-R	Continental four ninety go ahead
1738:29	COA49Ø	How about three five zero for awhile
1738:32	LEV-R	Continental four ninety be unable your request there's opposite direction traffic at three five zero could you accept flight level three seven zero and if so I need you level within uh four and a half to five minutes
1738:42	COA49Ø	Uh we're too heavy thanks
1738:45	LEV-R	Roger
(1739)		
1739:32	JAX	Leeville thirty-eight Nepta
1739:34	LEV-R	Leeville

1739:35	JAX	Delta eight fifty-seven will be direct Alex is not in the machine if you can approve that flight level four one zero wrong for direction
1739:40	LEV-R	Approved L D
1739:42	JAX	And Continental seventeen ninety-nine is deviating south of course
1739:44	LEV-R	L D
1739:44	JAX	(Unintelligible)
1740:00	LEV-R	TACA one ten contact New Orleans Approach one two three point eight five
1740:07	TAI110	Thank you sir one two three point eight five have a nice day
1740:11	LEV-R	Good day
1740:24	COA1799	Houston Continental seventeen nine nine with you uh three five oh
1740:28	LEV-R	Continental seventeen ninety-nine Houston Center roger advise me when you can turn towards New Orleans I'll have a heading for you New Orleans is NOTAMed out of service for the next two hours
1740:38	COA1799	OK it will be about eighty miles before we can uh head to the north Continental seventeen ninety-nine
1740:43	LEV-R	Continental seventeen ninety-nine roger
(1741)		
1741:07	LEV-R	Mexicana eight seventeen are you going to make any turns to the left
1741:12	MXA817	Uh I'd say we we hold this heading while one sixty-three for about uh thirty miles and from there we'll be flying to the airway but no more to the left
1741:25	LEV-R	Roger sir could you accept a turn to the right if we need it for traffic

1741:30	MXA817	OK in about uh is possible in about uh two minutes
1741:38	LEV-R	Mexicana eight seventeen roger when able turn twenty degrees right vectors for traffic advise me when you can take that turn
1741:45	MXA817	OK I'll call you (unintelligible)
1741:48	DAL857	Houston this is Delta eight five seven passing four zero zero for four one zero
1741:52	LEV-R	Delta eight fifty-seven Houston Center roger
(1742)		
1742:14	LEV-R	Continental four ninety do not make any turns to the left traffic is off to your left side now fifteen miles southbound at three three zero
1742:22	COA490	Continental four ninety roger then again we may have to go a little more to the right instead of south
1742:26	LEV-R	Roger
1742:27	LEV-R	Mexicana eight seventeen can you take that turn now
1742:30	MXA817	Yeah we will turn to heading one seven zero Mexicana eight seventeen
1742:34	LEV-R	Mexicana eight seventeen roger if you could uh could you turn to a one ninety heading
1742:39	MXA817	Affirmative one nine zero Mexicana eight seventeen
1742:43	LEV-R	Roger
(1743)		
1743:34	LEV-R	Mexicana eight seventeen your traffic is twelve o'clock one zero miles eastbound now and I'll have a uh heading to join Amber twenty six for you shortly
1743:42	MXA817	OK Mexicana eight seventeen standing by

1743:52	OAC-R	Ocean offshore
1743:53	LEV-R	Leeville Mexicana eight seventeen appreq a heading of one seven zero to join Amber twenty-six
1743:58	OAC-R	Approved C C
1743:59	LEV-R	L D
(1744)		
1744:01	LEV-R	Mexicana eight seventeen fly heading one seven zero join Amber twenty-six rest of route unchanged
1744:16	MXA817	Fly heading one seven zero for Mexicana eight seventeen thank you
1744:20	LEV-R	Mexicana eight seventeen contact Houston Center one three two point six five
1744:25	MXA817	Thirty-two sixty-five Mexicana eight seventeen thank you and so long
1744:29	LEV-R	Good day
(1745)		
1745:05	COA490	Center Continental four ninety
1745:07	LEV-R	Continental four ninety go ahead
1745:09	COA490	We'd like to descend out of thirty-three we getting beat around we got an overhang here we'd like to go down maybe uh twenty-eight or so
1745:14	LEV-R	Continental four ninety descend and maintain on flight level two niner zero and I can offer you flight level two niner zero or flight level two seven zero your choice
1745:21	COA490	Uh let's go down two seven
1745:23	LEV-R	Continental four ninety descend and maintain flight level two seven zero
1745:26	COA1799	Continental seventeen ninety-nine would like to get lower we're getting beat here

1745:30	LEV-R	Continental seventeen ninety-nine will you need to deviate any to the left
1745:33	COA1799	That's affirmative
1745:35	LEV-R	Continental seventeen ninety-nine I'll have lower for you in one minute
1745:46	OAC-R	Ocean offshore
1745:47	LEV-R	Leeville point out at Viper Continental four ninety deviating south descending to flight level two seven zero
1745:52	OAC-R	Continental four ninety point out approved C C
1745:54	LEV-R	L D
(1746)		

------------------------------END OF TRANSCRIPT------------------------------

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(1740)

1740:24	TAI110	New Orleans Approach good morning Taca one ten out of uh nineteen oh
1740:32	NR	I'm sorry uh sierra tango I didn't understand you what was your request
1740:36	ST	O K for I L S runway one eight right into Lakefront full stop
1740:39	NR	Ah right (be fine)*
1740:42	NR	Taca one ten roger vectors runway two eight final approach course continue inbound descend at pilots discretion maintain four thousand
1740:56	NR	Taca one ten deviation around weather is approved descend to four thousand vectors for the I L S runway two eight approach

(1741)

1741:02	TAI110	Thank you sir Taca four ten four thousand and deviation by weather is approved and uh we're leaving right now out of ah nineteen oh
1741:10	UNK	(unintelligible) southwest one twenty six
1741:12	N52K	and four seven five two kilo would like a heading of zero five zero if possible
1741:18	NR	Five two kilo approved as requested
1741:20	N52K	(unintelligible) thank you
1741:20	ZHU	North eighty point out

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1741:22	NR	Say again
1741:23	ZHU	North eighty point out
1741:25	NR	Point
1741:26	ZHU	Three miles south of Oysty code zero seven two one is a cheyenne inbound to Gulfport descending to one one thousand your approval
1741:31	NR	Point out approved
1741:32	ZHU	L T
1741:46	BTR	New Orleans Baton Rouge five three fox charlie coming on down to five R W
1741:59	NR	Baron seven zero sierra tango traffic's on a two mile final Southwest Boeing landing runway one nine
(1742)		
1742:04	NOST	sierra tango's got him
1742:24	NR	Baron seven zero sierra tango turn right heading zero five zero execute missed approach
1742:28	NOST	O K sierra tango going zero five zero
(1743)		
1743:31	UNK	With you out of six thousand nine hundred for three thousand
1743:35	NR	Commander one echo charlie roger descend to one thousand seven hundred

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1743:39	N1EC	one echo charlie down to one thousand seven hundred
(1744)		
1744:11	NOST	And approach sierra tango
1744:15	NR	Seven zero zero sierra tango go ahead
1744:17	NOST	Yessir this going to be radar vectors for I L S runway one eight right at Lakefront full stop
1744:21	NR	That's correct I L S runway one eight right vectors maintain seventeen hundred
1744:25	NOST	O K seventeen hundred thank you
1744:39	NR	Taca one ten approach say altitude
1744:45	NR	Taca one ten say altitude leaving
1744:53	NR	Taca one ten approach say altitude
(1745)		
1745:01	NR	Taca Taca one ten approach say altitude
1745:15	NR	Taca one ten this is New Orleans approach control how do you hear
1745:28	NR	Taca one ten approach
1745:28	HUM	Approach Houma ninety
1745:33	NR	November seven zero zero sierra tango turn left heading zero one zero

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1745:36	NOST	zero one zero sierra tango
1745:40	NR	November one five tango charlie turn right heading two eight zero
1743:44	N5TC	Right two eight zero tango charlie roger
1743:49	NR	Commander one echo charlie turn right heading one one zero
1745:54	N1EC	one echo charlie one one zero
1745:58	NR	Taco one ten this is New Orleans approach control how do you hear
(1746)		
1746:05	TA110	Mayday Mayday Taca one ten uh (we still out)* of uh twelve thousand and ah we're in the middle of the storm sir
1746:15	NR	Taca one ten roger Taca one ten roger how do you hear approach control
1746:22	TA110	We need vectors to the runway right now sir we lost an engine we got only one engine
1746:28	NR	Taca one ten roger Taca one ten say altitude
1746:33	TA110	Leaving eleven thousand
1746:35	NR	Taca one ten roger
1746:42	NR	Taca one ten uh fly heading zero one zero Taca one ten heading zero one zero
1746:48	TA110	Zero one zero Taca one ten

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1746:53	NR	November one zero echo charlie turn right heading one four zero
1746:58	N1EC	one echo charlie understand one four zero
(1747)		
1747:07	NR	Taca one ten approach ident
1747:13	NEW	Departure Lake eighty six
1747:15	NR	Taca one ten uh New Orleans approach turn left heading zero one zero vectors around the storm understand you have lost an engine is that correct
1747:22	TAI110	Both engines sir both engines
1747:26	NR	Understand both engines Taca one ten roger this be vectors to Navy Callender runway two two final approach course Taca one ten turn left heading three four zero
1747:38	TAI110	Three four zero right now
1747:40	NR	November seven zero zero sierra tango turn left heading three four zero
1747:45	NOST	Three forty sierra tango
1747:47	NR	Seven zero zero sierra tango contact approach control one two five point five
1747:51	UNK	(point five)*
1747:53	NR	November one echo charlie heading one four zero intercept the I L S runway one eight localizer maintain seventeen hundred until established your five north of Ampar correction I'm north of Alger cleared I L S runway one eight right approach

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(1748)

1748:12	NR	Taca one ten this vectors to Navy Callender runway two two final
1748:17	TAI110	What is that sir
1748:20	NR	Taca one ten I'm vectoring you to the closest airport I can sir Navy Callender airport there is a thunderstorm activity over the Navy Callender airport at this time off your left I'm vectoring your to the field
1748:30	TAI110	O K we are heading three four zero right now and ah out of ah eight thousand
1748:36	NR	Taca one ten roger turn left heading two eight zero left turn to two eight zero vectors to final Navy Callender runway two two
1748:46	TAI110	O K and uh heading two eight zero thank you
1748:52	TAI110	O K we have a we have a thunderstorm right here sir and uh I don't have both engines running and uh we're at seventy five hundred feet uh I'm declaring an emergency here and uh we trying to restart the engines O K

(1749)

1749:05	NR	K Taca one ten roger remain in the clear fly heading of zero one zero then
1749:12	TAI110	Zero one zero I don't have any engines O K any engines we gliding down O K
1749:16	NR	Understand you're gliding down Taca one ten roger
1749:19	NR	November five tango charlie contact approach one twenty five five

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1749:26	NR	Taca one ten the nearest airport is fifteen one five miles west southwest of your present position
1749:34	TAI110	O K can you give me a vector heading for there
1749:40	NR	Taca one ten turn left when able heading two eight zero
1749:45	NBG	Approach navy ninety need full call sign and squawk again
1749:46	TAI110	Heading two eight zero (unintelligible)
1749:48	NR	November one five tango charlie contact approach one two five point five
1749:53	NR	November seven zero zero tango contact approach one two five point five
(1750)		
1750:21	NR	Taca one ten your one seven miles from the airport runway two two at Navy Callender
1750:28	TAI110	O K we have one engines back we have one engine back I request a vector to New Orleans please
1750:33	NR	Taca one ten wilco fly heading two niner zero vector around the thunderstorm off your right
1750:39	TAI110	O K two niner zero on the heading
1750:42	NR	That's correct sir Taca one ten understand you do have an engine back
1750:46	TAI110	Yes sir

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1750:47	NR	All right sir maintain uh five thousand if you're able Taca one ten
1750:54	TAI110	O K I will
(1751)		
1751:10	NR	Taca one ten turn right heading three one zero vector around the uh weather over
1751:15	TAI110	Taca one ten three one zero
1751:17	NR	That's correct sir and I'm vectoring you to runway one nine at New Orleans International Airport the winds two three zero at one zero you can have runway two eight also if you like
1751:26	TAI110	O K sir we got both engines back now we really appreciated what you did for us we are uh going to uh three one zero heading and uh leaving four thousand
1751:38	NR	Taca one ten roger if you are able maintain four thousand
1751:41	TAI110	Four thousand
1751:49	IDA43	Tower Idaho forty three
1751:51	NR	Idaho four three uh check in with radar frequency twenty five five
1751:56	IDA43	yes sir I'm going back to uh tower here
(1752)		

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1752:01	NR	Taca one yea ten uh New Orleans approach your choice of runways the winds two three zero at niner at New Orleans International there is a storm a weather east of the airport approximately seven miles would you like to go to runway one nine or runway two eight your choice
1752:18	TAI110	We ah don't have any power on the engines
1752:26	NR	Taca one ten I'm going to vector you to runway uh one eight at Lakefront Airport would you prefer you're closer to the Lakefront Airport you're only about eleven miles away from Lakefront
1752:34	TAI110	O K uh I don't think that I will make it ah I don't I don't have any power on the engines we are (unintelligible) for lower but we don't have any power on the engines here sir so I guess we having to go down we have to go down uh we declare emergency we're going to start work to put this thing over
1752:51	NR	Taca one ten understand you are uh descending you have no power on the engines roger
1753:00	TAI110	O K we're going to decide to put it here and where will be the best for you guys
1753:09	NR	Taca one ten do you have visual reference to the ground at this time
1753:12	TAI110	Yes sir
1753:19	NR	Taca one ten there is the interstate highway directly ahead of you at twelve o'clock and six miles
1753:26	TAI110	O K and let's see where what is it
1753:29	NR	That's the uh interstate highway interstate ten that runs northeast southwest presently you are over the water over Lake Borgne

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1753:38	TAI110	Yes sir I don't believe uh we gonna be able to make it there sir
1753:47	NR	Taca one ten you're seven miles away from the Lakefront Airport you're seven miles away from landing at Lakefront Airport can you make it there
1753:54	TAI110	No sir we're at two thousand and uh we're loosing altitude uh hundred and fifty I guess I got to make a ditching here sir
(1754)		
1754:03	NR	O K Taca one ten there's an interstate highway directly ahead of you I suggest that you have to go down do not go straight ahead you'll run right into uh traffic on the ground
1754:14	TAI110	O K we're uh well the only thing I do right now is make a three sixty here I'll land over the water sir
1754:23	NR	K Taca one ten roger whatever you need to do sir
1754:30	NR	Taca one ten the altimeter at New Orleans two niner niner zero the wind two zero zero at niner
1754:51	NR	Taca one ten I show your altitude now seven hundred feet
(1755)		
1755:50	NEW	And approach Lake eighty six I'm holding everybody on the ground over here at Lakefront
(1756)		
1756:13	NBG	Approach Navy ninety
1756:34	ZHU	North side eighty handoff

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DRAFT

1757:04	N93U	New Orleans approach baron six five nine three uniform with you six thousand with India
1757:12	N93U	Left one four zero nine three uniform
1757:48	WR	KingAir four three foxtrot charlie turn right heading one five zero intercept the localizer you're three miles from Mandi maintain two thousand until established on the localizer cleared for the I L S runway one eight right at Lakefront
(1758)		
1758:33	NEW	And departure Lake eighty six line appreq
1758:36	WR	Go ahead
1758:39	NEW	Can I get a left turn for six two kilo alpha for weather
1758:40	N208	Commander three one two zero eight three thousand with sierra
1758:41	WR	For weather
1758:42	NEW	Yeah
1758:43	WR	All right zero nine zero
1758:45	NEW	Zero nine zero (unintellibible)
1758:46	WR	J B
1758:47	WR	Lifeguard two ah zero eight AeroCommander Lifeguard two zero eight roger maintain three thousand

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1758:53	WR	Baron five correction niner three uniform uh turn right heading one five zero join the I L S final descend and maintain four thousand
1759:00	N93U	Out of six for four nine three uniform join the localizer for the back course
1759:41	WR	Baron nine three uniform verify you are you landing at Lakefront or Moisant
1759:44	N93U	nine three uniform we're landing Moisant
1759:46	WR	Moisant O K my mistake sir fly heading two one zero join the localizer for the localizer backcourse one nine approach maintain uh four thousand
1759:53	N93U	Roger two one zero nine three uniform
1759:56	NR	Lifeguard november two zero eight turn right heading one one zero descend and maintain two thousand
1800:00	LN208	One one zero down to thousand two zero eight
1800:08	N2KA	And New Orleans six two kila alpha out of eight hundred for two thousand gonna turn zero nine zero
1800:14	NR	Six two kilo alpha New Orleans departure radar contact
1800:25	NR	Six two kilo alpha say your inflight conditions
1800:28	N2KA	Uh heavy rain right now
1800:30	NR	You got any visual reference to the ground
1600:32	N2KA	Ah little bit off to our left side
1800:34	NEW	And approach Lake eighty six zero sierra tango need's to break it off can I ah turn him out to the east

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DRAFT

1800:39	NR	Six to kilo alpha roger climb and maintain one five thousand if you could for me sir uh check to your east and just slightly to the south about three to four miles we lost an aircraft down there a seven thirty seven and if you can pick it up uh let me know what you see
1800:53	N2KA	O K we'll be looking
1800:57	N2KA	Ah east how many miles
1800:59	NR	Uh Zero sierra tango a left to eighty
(1801)		
1801:01	NEW	Eighty here he goes
1801:05	N2KA	Six two kilo alpha we're V F R now that was east and how many miles
1801:08	NR	Bout your one o'clock now two to three miles
1801:11	N2KA	One o'clock and two to three miles
1801:17	G389	And New Orleans approach Guard ah zero two three eight niner ah at eight thousand with you we like to deviate along to the
1801:27	NR	Guard two zero three correction two three eight niner deviate as necessary for the weather New Orleans altimeter two niner eight one correction two niner niner one
1801:34	G389	Roger and we'll be deviating to the south
1801:37	N2KA	And ah it looks like we see one on this grass strip down here by the river
1801:41	NR	O K a seven thirty seven

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1801:43	N2KA	Uh stand by
1801:45	N2KA	It looks like its sir with the ah chutes out (unintelligible) like to pass by it
1801:47	UNK	(unintelligible) We're going up to three then we'll go around (unintelligible)
1801:47	NEW	Departure Lake eighty six uh north Lake eight six
1801:54	NR	O K Six two kilo alpha if you could I'd appreciate it with a right turn and ah let me know what you see sir
1801:59	N2KA	O K we will go down a litte bit and take a look post you
(1802)		
1802:03	UNK	God
1802:05	NEW	North Lake eighty six
1802:07	NR	Go ahead
1802:09	NEW	three foxtrot charlie needs to turn out due to weather
1802:10	NR	Give him a right turn heading of ah two eight zero maintain two thousand
1802:11	NEW	Two eight zero and two J (unintelligible)
1802:24	NR	Two Q two kilo alpha what do you see
1802:26	N2KA	O K we see the chutes are open and about four or five vehicles or a whole bunch of vechicles screaming streaming out there now and ah ah that's about what we can see a bunch of cars going out there right now

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1802:37	NR	O K is the aircraft intact is it on a highway
1802:39	N2KA	Ah it's on one of these embankments its intact
1802:43	NR	O K thank you very much sir ah you can fly heading when able zero eight zero maintain one five thousand ah is there any smoke or fire
1802:50	N2KA	Ah negative every thing looks O K looks like he did he did a pretty good job on it
1802:54	NR	O. K so its on on the levee
1802:55	N2KA	Affirmative looks right on the side of the levee and everything looks intact theres a bunch of people standing about a hundred yards away from the airplane around an ambulance but other than that it looks O K
	NR	six two kilo alpha thank you very much sir climb and maintain one five thousand
	N2KA	Thank you

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~~(37)~~

DEPARTMENT OF TRANSPORTATION **FEDERAL AVIATION ADMINISTRATION** **REPORT OF AIRCRAFT ACCIDENT** (Continuation Sheet)	REPORT DATE 05/27/88	ORT NO. MSY-89
	NAME OF REPORTING FACILITY MSY ATCT	

14. CHRONOLOGICAL SUMMARY OF FLIGHT *(Including control or other services provided by ATS facilities, and emergency action taken.)*

All times are approximate Coordinated Universal Time unless otherwise specified.

May 24, 1988

17[illegible] UTC	Initial contact with the pilot of TACA 110. The pilot advised descending from nineteen thousand feet.
1740 UTC	Moisant Approach advised the pilot of TACA 110 to expect Runway 28 at Moisant and approved deviations around weather.
1744 UTC	Moisant Approach Controller observed the disappearance of TACA 110's computed data tag. He attempted, unsuccessfully, to contact the pilot of TACA 110.
1746 UTC	The pilot of TACA 110 broadcast MAYDAY advising he was in the middle of the storm and had lost an engine.
1747 UTC	The pilot of TACA 110 advised the loss of both engines.
1748 UTC	Moisant Approach Controller advised the pilot of TACA 110 that he would vector him to Navy Callender, the closest airport. He also stated that there was thunderstorm activity over that airport.
1749 UTC	The pilot of TACA 110 advised he was at seventy five hundred feet and declaring an emergency.
1750 UTC	The pilot of TACA 110 advised that one engine was back and requested vectors to New Orleans.
1751 UTC	The pilot of TACA 110 advised that both engines were back.
1752 UTC	Moisant Approach Control advised the pilot of TACA 110 that Runway 19 or Runway 28 would be available to him at Moisant. The Controller also advised the pilot of an area of weather approximately seven miles east of Moisant.
1752 UTC	The pilot of TACA 110 advised that he had no power on the engines.
1752 UTC	Moisant Approach advised the pilot of TACA 110 of the location of Lakefront Airport, the nearest to his position.
1752 UTC	The pilot of TACA 110 advised he would not be able to make it to Lakefront.
1754 UTC	The pilot of TACA 110 advised that he would land over the water.
1755 UTC	Moisant Approach observed the computed data tag of TACA 110 enter coast status.
1802 UTC	The pilot of N2KA overflew TACA 110 and advised that the aircraft was intact and people left the aircraft via the chutes.

NO MORE FOLLOWS

DRAFT

FACILITY ACCIDENT NOTIFICATION RECORD	Aircraft Ident TAI110
	Date 5/24/88

The order and number of calls will be determined by the situation involved.

	Phone No.	Time	Initials: Caller	Initials: Recipient
Airport Emergency Equipment	Red Phone 464-2688/89			
Additional Emergency Equipment	Kenner Fire Dept. 467-2211			
Search & Rescue	382 Line, Dial 02 589-6225	1755	BA	
Washington Com Center /1 FTS COMM	8-393-4444 202-331-2222		BZ	
Region Com Center FTS COMM	8-734-2010 817-877-2010		BZ	
FSDO-60 FTS COMM	8-741-2150 214-574-2150			
FSDO-62 FTS COMM	8-687-0755,6,7 504-356-5701	1805	BZ	
Aviation Weather	Direct 008 Line	1800	BZ	
Military Authority NBG OPS NBG TWR	393-3101 393-3208			
Airport Authority A/COM AVCOM	464-0831 464-2707	1810	BZ	
Airways Facility Sector Chief	467-4571, 466-9001 468-8084/5	BZ	Radar @1820	
Aircraft Operator		1810	BZ	
Local Coordinator, Ken Friar Asst. Manager, J. E. Stevens	1-646-1837 651-2663			
Police - State	483-4830 483-4834	NO ANSWER		
Police - Airport	464-2693,4,5			
NTSB - Fort Worth FTS COMM	8-334-2626 817-334-2616			
NTSB - Washington FTS COMM	8-382-6820 202-382-6820			
Civil Air Patrol	241-9530 568-4987			
Jefferson Levee Board Orleans Levee Board	362-8700 241-6746			
KPD New Orleans Police	468-7777 821-2222			

/1 Accidents requiring telephone notification to Washington shall be made immediately following notification for emergency equipment and/or search and rescue.

DAILY RECORD OF FACILITY OPERATION

PAGE NO.	DATE	CHECKED BY	CHIEF
1 of 1	5-24-88		K. R. FRIAR

LOCATION	IDENTIFICATION	TYPE FACILITY	OPERATING POSITION
NEW ORLEANS, LA	MSY	TRACON	AREA SUPERVISOR

TIME (GMT)	REMARKS
0500	RJ ONW, CFPL: RY 10 ALS, GS, MM, IM OTS; RY 28 MM OTS; QUINT OTS; WCLC.
0950	RY 10 DME IN ALARM.
1045	SN ONW. LND RY 19, DEP RY 28.
1200	RY 10 DME RTS, ACN
1205	119.5 TMSTRS UNUSEABLE, 118.1 IN USE. AFS ADV.
1210	119.5 rts.
1315	MSY VORTAC OTS 1400Z till 2000Z FOR MAINT, ACN.
1330	RY 1/19 CLSD BY NOAB, LND AND DEP RY 28. ACN.
1345	WCLC.
1605	RY 1/19 OPEN. LND19 DEP28.
1645	BA ONW.
1755	TAI110 MADE AN EMERGENCY LANDING APROX 6 NM S.E. OF NEW.
2000	sp onw.
2022	LATE ENTRY AT 1945 MSY VOR RTS.
2034	L10 D19.
2052	L19 D28.
2102	TRACON ELECTRWRITER OTS MAINT ADVZ.
0010	L28 D19.
0020	L1 D 1.
0111	L1 D28, WCLC.
0400	KT ONW.
0659	COB.

I CERTIFY that entries above are correct; that all scheduled operations have been accomplished, except as noted, and that all abnormal occurrences and conditions have been recorded.

SIGNATURE(S) OF WATCH SUPERVISOR(S) [redacted] [redacted] [redacted] [redacted]

POSITION LOG

1 FACILITY ID	2 POSITION IDENTIFIER	3 POS TYPE	4 DATE MONTH DAY YEAR
MSY	NR	AP	05 24 89

5 TIME ON	6 INITIALS	7 TIME OFF	8 CODE	WHERE COMBINED 9 POSITION IDENTIFIER	10 POSITION TYPE
0500		1045		LC	LC
1046	KT	1214	C		
1215	JB	1357	C		
1358		1418		SR	AP
1419	JB	1439	C		
1440	LA	1641	C		
1642	JH	1757	C		
1758	JB	1939	C		
1940	AM	2132	C		
2106	DR	2310	T		
2133	DH	2310	C		
2311	DC	2359	C		
0000	DH	0122	C		
0123	MK	0333	C		
0334				LC	LC

CODE
C - ATCS or FDS is responsible for position
S - Supervisor, Staff Specialist, manager is responsible for position
T - Person signed on is receiving OJT

FAA FORM 7230-10 (8-83)

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TAI11Ø	2557	A1739	IFR	
B737/A	LEV			
426	GOING	.	MSY	

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GI W1 ATTN AEX/NEW/HOU SPCLTY AND FDEPS EAST IAH. ZHU1 CWA 02 VALID
241625-241800. FROM 10S MSY TO 50SSE LFT..20 MI WIDE BAND OF SCT
TSTMS MOVG EAST AT 35 KTS. MAX TOP ABV 450 AT 55S BTR. WC/241633

GI W1 ATTN AEX/NEW SPECLTYS..CONVECTIVE SIGMET 2C..VALID UNTIL 1655Z
..FROM 50SE MSY-90S CEW-120SE MSY-110SSE MSY-50SE MSY..AREA TSTMS
MOVG E AT 35KTS..TOPS 400..WC241658

NEW NBG HUM

GI W1 ATTN AEX/NEW/HOU..ZHU CWA 03..VALID 241735-241900..FROM 20E
MSY TO 75S BTR..20 MI WIDE BAND OF SEVERE TSTMS MOVG E AT 35KTS..HAIL
ALF TO 2 INCHES/50KTS. SFC WNDS PSBL..WC241742

COR, HUM IN NEW IN BTR

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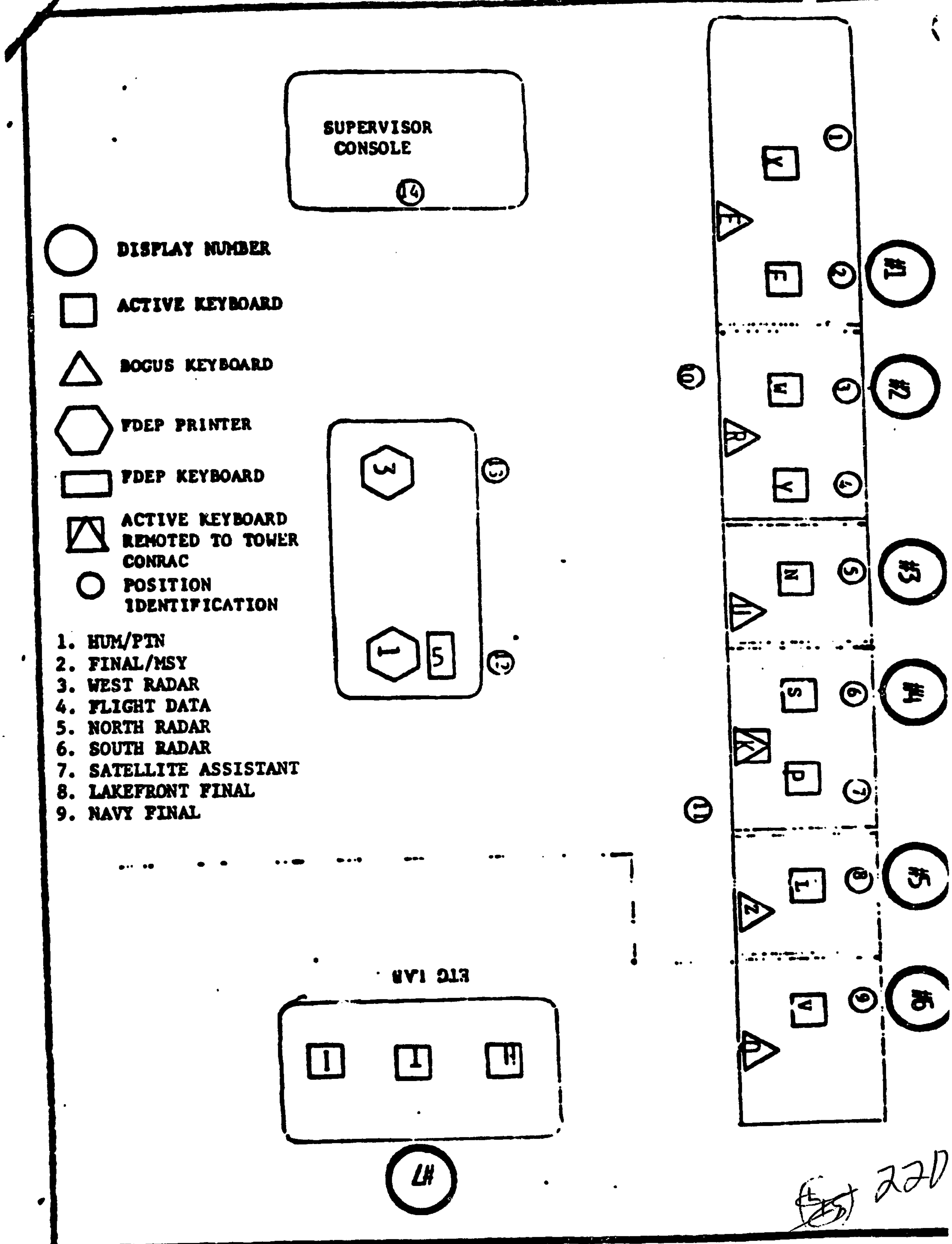
MOISANT TRACON LAYOUT



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Houston Air Route Traffic Control Center and
Moisant Airport Traffic Control Tower

LETTER OF AGREEMENT

EFFECTIVE: March 13, 1986

SUBJ: Approach Control

1. PURPOSE. The following agreement between Houston ARTC Center and Moisant ATC Tower covers approach control service for all airports within the airspace delegated to New Orleans Approach Control and is supplemental to procedures contained in appropriate air traffic control handbooks.

2. CANCELLATION. This agreement cancels and supersedes the Houston Center and Moisant Tower Letter of Agreement of same subject, dated January 19, 1984, and all revisions and annexes thereto.

3. SCOPE. The airspace delegated to New Orleans Approach Control, the radar and nonradar arrival/departure routes, and holding patterns are depicted in Annex 1.

4. PROCEDURES.

a. General.

(1) Deviations from procedures in this agreement may be effected on an individual aircraft basis after prior verbal coordination. Deviations required for random arrival/departure procedures over a given time period shall be coordinated by the Houston Center New Orleans area supervisor and the New Orleans Approach Control supervisor. The facility receiving the request for the deviation shall be the approving authority for any procedural deviations.

(2) Silent clearances and random arrival/departure route procedures during outage of Center radar or Approach Control radar are specifically prohibited and are not subject to coordination.

(3) The minimum radar separation between aircraft being handed off shall be 5 miles, constant or increasing. The receiving facility shall have responsibility for determining when the radar interval shall be increased and/or radar handoffs are to be discontinued.

(4) When the Center computer is operational, aircraft shall be issued computer-assigned codes.

(5) When the Center computer FDEP is not functioning, departures shall be issued code 4300 and arrivals code 5200 or assigned by the receiving facility.

b. Arrival Control.

(1) An airport clearance limit shall be used when arriving aircraft are being provided radar service.

(2) The Center shall ensure that arriving aircraft proceed via the preferential routes to remain clear of the departure gates as depicted in Annex 1.

(3) After receipt of a handoff, Approach Control may descend arrivals during radar operations. The route/heading may be altered not to exceed 30 degrees either side of the assigned route or heading provided this heading change will not take the aircraft into another Center sector and/or departure gate prior to reaching the confines of Approach Control airspace.

(4) The Center shall establish aircraft of similar types and/or speeds on the same route intrail.

(5) Altitude assignments shall be:

(a) Turbojet aircraft 11,000 feet except turbojets from over Lafayette/Baton Rouge landing other than Moisant shall be cleared via V20 or J2 descending to 13,000 feet.

(b) Aircraft executing a published penetration descending to 16,000 feet at GRETL or 14,000 feet at RICKK.

(c) Nonturbojet aircraft over OYSTY, BEMAR, and GOING descending to 7,000 feet, and those landing Lakefront over OYSTY or SNALY descending to 3,000 feet.

(d) Aircraft arriving via the HRV R-075 to cross the common Houston/Moisant boundary established on the HRV R-075 descending to 11,000 feet.

* (6) Aircraft landing Moisant from over Baton Rouge/Lafayette/ White Lake shall be cleared via the AWDAD STAR except nonturbojets over Baton Rouge shall be cleared V114 MSY. *

(7) Aircraft landing at NEW or NBG from over LLA shall be cleared via V198 HRV direct to destination airport.

(8) When the HIKOR departure gate is inhibited, the HIKOR gate along with the SLIDD gate becomes the arrival gate from the east.

(9) Inbounds to Harry P. Williams Airport shall be cleared to the Patterson radio beacon.

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(10) The Center shall hand off nonturbojets landing in the New Orleans terminal area overlying Baton Rouge airspace to Baton Rouge Approach Control.

(11) The Center shall hand off nonturbojets landing in the New Orleans terminal area overlying Gulfport airspace to Gulfport Approach Control.

c. Departure Control.

(1) When silent clearances are in effect, New Orleans Tower shall formulate and issue departure clearances to aircraft departing airports under Approach Control jurisdiction using the "cleared as filed" procedure or issuing a full route clearance (FRC) as appropriate. Unless otherwise coordinated via interphone, Approach Control shall assign the route(s) indicated between the plus signs on computer-generated strips except NOLA stereo routes which are "cleared as filed."

(a) When landing Runway 28 at Moisant, Approach Control may contact the Center area supervisor and request SNAKI gate be inhibited for MSY and NEW departures.

(b) When aircraft are departing Runway 10 and/or 19 at Moisant, all eastbound departures shall be routed via the SNAKI gate. The Approach Control supervisor shall call the Center area supervisor and coordinate a time for the HIKOR departure gate to be inhibited.

(c) All aircraft departing eastbound from NBG shall be cleared via the computer-generated PDR.

(2) Altitude assignments shall be:

(a) Aircraft filing altitudes at 15,000 feet or below shall be cleared at the requested altitude.

(b) Aircraft filing altitudes above 15,000 feet shall be cleared at 15,000 feet with instructions to expect further clearance to filed altitude 10 minutes after departure.

(c) Aircraft departing airports lying outside of the area encompassed by the 15,000 feet airspace delegated to Approach Control shall be cleared at altitudes within the vertical confines of airspace delegated to Approach Control for those respective areas unless coordination is effected with Houston Center.

(3) Prior to making a handoff to the Center, New Orleans Approach Control shall ensure departures are established in and will remain in the appropriate Center sector. For this purpose, the Center sector boundaries shall be considered as extending to the New Orleans VORTAC.

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(4) Aircraft shall be established on a heading that will proceed through the departure gate, remain diverging, or at least parallel to the adjacent arrival routing as depicted in Annex 1.

(5) After receipt of a handoff, Houston Center may climb departing aircraft except those cleared to maintain an altitude below 15,000 feet or change the heading provided the aircraft continues through the assigned departure gate as depicted in Annex 1.

(6) Silent clearance procedures are specifically prohibited for aircraft entering the Center's Offshore Sector.

d. Nonradar.

(1) Arrival/Departure.

(a) The Center shall clear arriving aircraft other than those executing a published penetration via arrival routes depicted in Annex 1 when Center radar is out of service.

(b) During times of Center radar outage, Approach Control shall ensure arrivals maintain Center-assigned altitude until the aircraft is within the vertical limits of Approach Control airspace.

(c) Approach Control shall ensure aircraft assigned a nonradar route by the Center are established on the assigned radial at the time of transfer of control.

(d) When Approach Control radar is out of service, after appropriate coordination, arrivals will be handled as follows:

1 Approach Control will release to the Center 8,000 feet and above. This airspace 8,000 feet through 15,000 feet will be delegated to the Baton Rouge Sector.

2 All aircraft will be cleared to the nonradar clearance limits depicted in Annex 1.

3 Turbojet aircraft shall be assigned 11,000 feet and above. Nonturbojet aircraft shall be assigned 8,000 feet and above.

4 Baton Rouge Sector will transition all inbounds to the New Orleans terminal area to the appropriate initial approach fix.

5 Baton Rouge Sector will issue all departure clearances, work all aircraft, and establish all departures in the appropriate gate climbing to the requested altitude or 15,000 feet if a higher altitude is requested.

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e. Overflights.

(1) Approach Control shall be the approving authority for overflights within Approach Control airspace.

(2) Overflights shall be considered coordinated upon receipt of printed data by Approach Control.

f. Offshore Helicopter.

(1) Inbounds via the TIBBY offshore helicopter routes shall be assigned 4,000 feet.

(2) Outbounds via the HARVEY offshore route shall be cleared at 5,000 feet. Inbounds shall be cleared to the HRV100020 at 4,000 feet.

5. MISCELLANEOUS.

a. During periods when adjacent Approach Control airspace is returned to the Center, Approach Control shall manually coordinate flight data on all affected flights that will next enter Center airspace.

b. Nonturbojets landing in New Orleans Approach airspace overflying adjoining approach controls shall be handed off to the adjoining approach control.

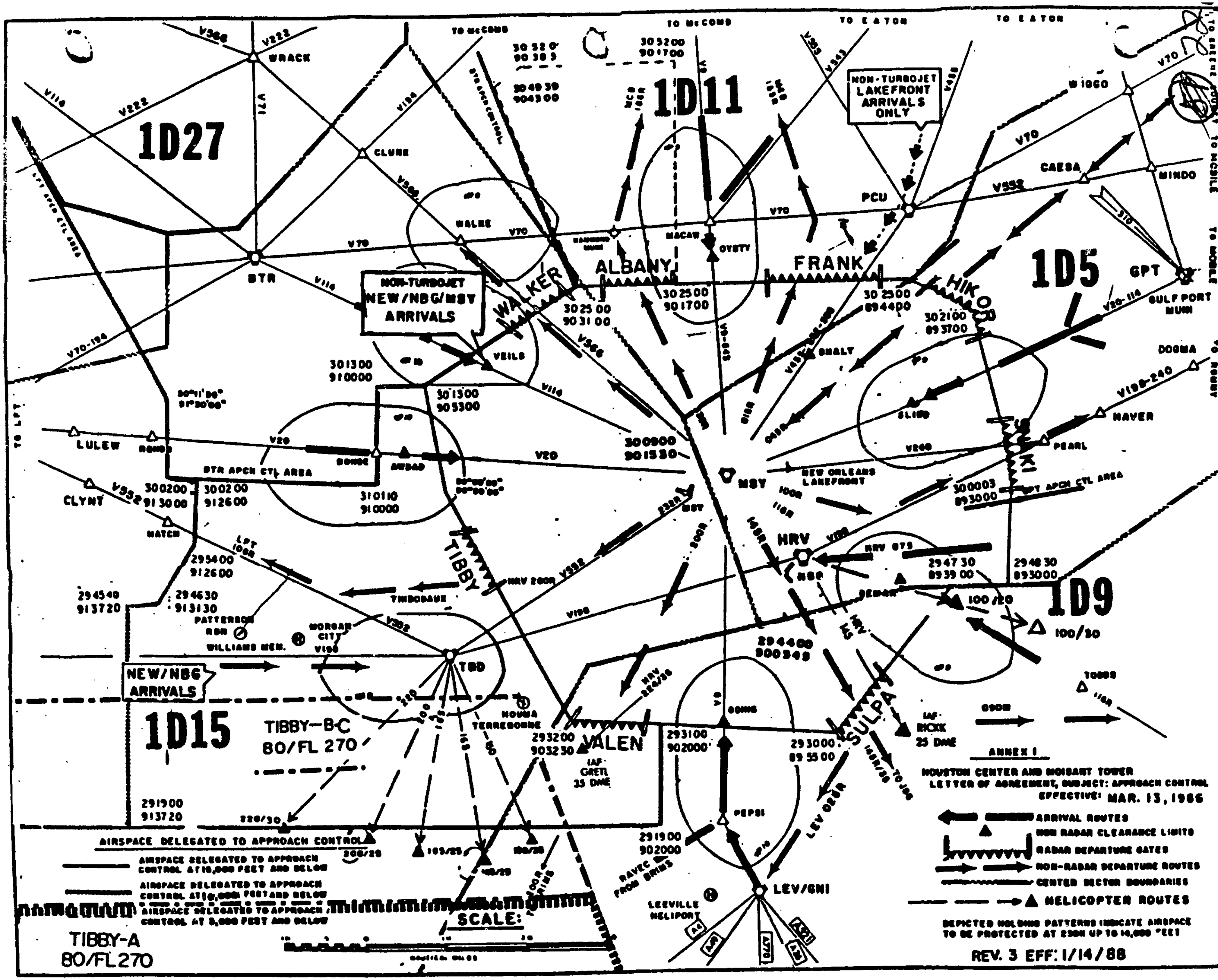
c. Midwatch operation: When approach control functions are performed from the Tower Cab and coordination is effected with Houston Center, New Orleans Approach Control will release its airspace 6,000 feet and above to the Center.

[redacted]

JACK L. HARDY
Air Traffic Manager
Houston ARTC Center

[redacted]

KENNETH R. FRIAR
Air Traffic Manager
Moisant ATC Tower


1D27
1D11
1D5
1D9
1D15
WRACK
CLUNE
BTR
WALKE
NON-TURBOJET
NEW/NBG/MSY
ARRIVALS
NON-TURBOJET
LAKEFRONT
ARRIVALS
ONLY
WALKER
ALBANY
FRANK
HIKO
PCU
CAESA
MINDO
GPT
GULF PORT
DOGMA
NAVER
PEARL
SLIDD
MSY
NEW ORLEANS
LAKEFRONT
HRV
NBG
TIBBY
VALEN
SULPA
LEV/GNI
PEPSI
LULEW
CLYNT
TBD
TERREBONNE
HOUMA
THIBODAUX
PATTERSON
WILLIAMS MEM.
MORGAN CITY
NEW/NBG
ARRIVALS
BTR APCH CTL AREA
TIBBY-B-C
80/FL 270
TIBBY-A
80/FL270
AIRSPACE DELEGATED TO APPROACH CONTROL
SCALE:
LEEVILLE
HELIPORT
ANNEX I
HOUSTON CENTER AND MOISANT TOWER
LETTER OF AGREEMENT, SUBJECT: APPROACH CONTROL
EFFECTIVE: MAR. 13, 1986
ARRIVAL ROUTES
NON RADAR CLEARANCE LIMITS
RADAR DEPARTURE GATES
NON-RADAR DEPARTURE ROUTES
CENTER SECTOR BOUNDARIES
HELICOPTER ROUTES
DEPICTED HOLDING PATTERNS INDICATE AIRSPACE
REV. 3 EFF: 1/14/88

Weather Group Chairman's Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D.C. 20594

September 23, 1988

WEATHER GROUP CHAIRMAN'S FACTUAL REPORT
FTW 88-MA-109

A. ACCIDENT

Location: New Orleans, Louisiana
Date : May 24, 1988
Time : 1256 c.d.t. */
Aircraft: Boeing 737-300, N75356, operating as TACA International Airlines, SA, Flight 110

B. WEATHER GROUP

Chairman: James C. McLean Jr., Meteorologist, NTSB
Member: Neal Barr, Boeing Aerospace Company
Ronald Rees, General Electric Co.

C. DETAILS OF THE INVESTIGATION

1. Synoptic information

The 1000 surface weather map, prepared by the National Weather Service, showed a weak low pressure area over western Kentucky with a trough line extending southwest through central Louisiana west of New Orleans. Conditions in the vicinity of New Orleans were characterized by moderate southwesterly winds and a broken cloud cover reported as cumulus and cumulonimbus.

On the 1300 surface weather map, the trough line had moved northwest away from New Orleans and an instability line head developed north of New Orleans oriented east-west through southern Mississippi and southern Alabama. Conditions in the vicinity of New Orleans were characterized by light to moderate south-southwesterly winds, with broken to overcast skies and cloud types reported as cumulonimbus with thunderstorms.

2. Surface observations

The following are the surface observations at New Orleans International Airport and New Orleans Lakefront Airport at the approximate time of the accident:

*/ All times used herein are central daylight time based on the 24 hour clock.

New Orleans International Airport

Time--1155; type--surface aviation; clouds--3,000 feet scattered, ceiling estimated 25,000 feet broken; visibility--7 miles; temperature--81°F.; dew point--71°F.; wind--240 degrees 9 knots; altimeter--29.91 inches; remarks--clouds scattered variable broken, cumulonimbus, rain showers intensity unknown south.

Time--1242; type--special; ceiling--measured 1,900 feet broken, 25,000 feet overcast; visibility--7 miles; wind--250 degrees 8 knots; altimeter--29.91 inches; remarks--cumulonimbus southeast through southwest moving east, occasional lightning in cloud, rain began 1205 ended 1215.

Time--1255; type--record special; ceiling--measured 2,300 feet broken, 25,000 feet overcast; visibility--7 miles; temperature--75°F.; dew point--70°F.; wind--150 degrees 12 knots; altimeter--29.91 inches; remarks --cumulonimbus southeast through southwest moving east, occasional lightning in cloud, windshift 1253, rain began 1205 ended 1215, aircraft mishap.

New Orleans Lakefront Airport

Time--1150; type--surface aviation; ceiling--measured 2,500 feet broken, 8,000 feet broken, 25,000 feet broken; visibility--10 miles; temperature--82°F.; dew point--70°F.; wind--230 degrees 13 knots; altimeter--29.93 inches; remarks--cumulonimbus northeast and southeast through northwest.

Time--1205; type--special; ceiling--measured 2,500 feet broken, 25,000 feet overcast; visibility--8 miles; weather--thunderstorm; wind--240 degrees 12 knots; altimeter--29.93 inches; remarks--thunderstorm began 1203 southwest moving east, frequent lightning in cloud and cloud to ground.

Time--1232; type--special; ceiling--estimated 4,500 feet broken, 25,000 feet overcast; visibility--8 miles; weather--thunderstorm; wind--180 degrees 13 knots; altimeter--29.89 inches; remarks--thunderstorm south through southwest moving east, occasional lightning in cloud and cloud to ground, pressure falling rapidly.

Time--1253; type--surface aviation; ceiling--estimated 4,500 feet broken, 25,000 feet overcast; visibility--8 miles; weather--thunderstorm; temperature--77°F.; dew point--71°F.; wind--170 degrees 10 knots; altimeter --29.88 inches; remarks--thunderstorm began 1203 overhead through south through northwest moving east, occasional lightning in cloud and cloud to ground.

3. Radar information

The 1233 radar observation from the National Weather Service radar at Slidell, Louisiana, reported an area with 1/10 coverage of thunderstorms with rainshowers to level 4 (heavy). The maximum top was 52,000 feet, about 35 miles west-southwest of the location where Flight 110 lost power. The cells were moving from 270 degrees at 30 knots. Based upon a plot of the track of Flight 110, the aircraft lost power 2 to 3 miles after entering the plotted area.

The gridded information with the 1233 observation put the point where Flight 110 lost power in a grid square with up to level 4 (very heavy) rain showers.

The 1310 special radar observation put the point where Flight 110 lost power within an area of 2/10 coverage of thunderstorms with rainshowers to level 4 (very heavy). The maximum top was 50,000 feet about 39 miles west-southwest of the location where Flight 110 lost power. The cells were moving from 270 degrees at 38 knots. The point where Flight 110 lost power was about 42 miles north of the southern periphery of the area.

A photograph of the National Weather Service radar PPI scope taken at 1242 was overlayed over the track of Flight 110 as plotted from ATC information. Based upon this overlay, the aircraft first penetrated a hard radar echo at 1240:00 at 18,270 feet at an approximate location of 29 degrees 24 minutes north, 89 degrees 56 minutes west. There was insufficient detail on the photograph to determine the contoured levels of activity within the hard echo.

4. Sounding information

The 0615 sounding at Boothville, Louisiana, showed a moist layer (temperature dew point spread equal to or less than 4°C) from the surface to 2,325 feet and 2,972 feet. The freezing level was at 12,421 feet. The temperature at 18,270 feet, the approximate altitude where Flight 110 entered the hard radar echo was (-)14°C. The temperature at 16,500, the approximate altitude where Flight 110 lost power was (-)9.8°C.

The 1815 sounding at Bootheville showed moist layers from the surface to 1,446 feet and between 17,286 feet and 18,988 feet. The freezing level was at 13,192 feet. The temperature at 18,270 feet was (-)11.7°C, and at 16,500 feet (-)8.2°C.

The following are the winds aloft observed at the time of the 0615 and 1815 soundings at Boothville from the surface to 20,000 feet:

Altitude (feet (above sea level)	Direction (degrees true)	Speed (knots)
0615	200	10
3 (surface)	208	21
1,817	212	20
2,645	228	17
3,636	243	17
4,547	246	20
5,483	247	23
6,462	241	27
7,440	238	32
8,430	243	33
9,425	247	33
10,416	241	35
11,413	237	39
12,411	236	42
13,385	237	41
14,354	242	45
15,359	257	48
16,345	262	47
17,323	270	48
18,264	271	53
19,170	272	50
20,161	272	49
1815		
3 (surface)	210	15
794	235	22
1,605	251	26
2,391	256	28
3,189	252	29
4,017	255	30
4,845	259	32
5,694	258	31
6,540	258	31
7,384	262	33
8,214	269	36
9,039	270	38
9,859	265	39
10,700	261	45
11,552	258	49
12,342	257	47
13,127	260	52
13,932	264	53
14,890	269	48
15,950	273	50
16,907	277	50
17,858	281	49
18,804	279	43
19,710	273	37
20,606	270	30

5. Liquid water content calculations

Assuming a rainfall rate at the high end of a level 4 (very heavy) of 4.5 inches per hour, the liquid water content of the atmosphere was computed giving 5.4 grams of liquid per cubic meter of rainfall based upon an average drop size of 1 millimeter. The cloud moisture was computed to be 4.4 grams of liquid per cubic meter based upon a drop size of less than 0.1 millimeters. The total liquid water content was 9.5 grams of liquid per cubic meter.

Based upon the Bootheville soundings the density of the air at 500 millibars (18,983 feet m.s.l.) was 608 grams per cubic meter. Using the computed liquid water content the water-air ratio at 500 millibars would have been 1.6 percent.

It should be noted that the computation of liquid water content does not include hail. There is no information available which would indicate the mean size or number of hailstones. Additionally a fall velocity of the raindrops of 620 centimeters per second was used. This does not consider vertical motions of the atmosphere. Consequently although the numbers for liquid water content given here are considered to be representative for a level 4 thunderstorm cell, the actual conditions encountered by Flight 110 could have varied considerably from these computed amounts.

6. Weather forecasts

The following are the pertinent excerpts from the Area Forecast issued by the National Aviation Weather Advisory Unit at Kansas City, Missouri, at 0445 and valid after 0500:

Hazards valid until 1700.
Flight precautions for Louisiana: IFR, turbulence.

Turbulence:
From Thunder Bay (Ont.) to Wiarton (Ont.) to Cincinnatti (OH) to Henderson (WV) to Bristol (TN) to Crestview (FL) to 80 miles southeast of New Orleans (LA) to Placios (TX) to Oklahoma City (OK) to Dubuque (IA) to Thunder Bay (Ont).
Moderate turbulence below 6,000 feet. Conditions diminishing around 1700.

Significant clouds and weather valid until 1700.

IFR.
From McComb (MS) to 80 miles southeast of New Orleans (LA) to Palacios (TX) to Brownsville (TX) to 80 miles west of Brownsville (TX) to Laredo (TX) to Houston (TX) to McComb (MS).

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Occasional ceiling below 1,000 feet and/or visibility below 3 miles in fog. Conditions improving by 1000.

Louisiana.
Northern portion: above ground level 5,000 feet scattered to broken. Isolated light rain showers. Tops 20,000 feet. Isolated thunderstorms with moderate rain showers after 1100. Cumulonimbus tops 35,000 feet.
Southern portion: above ground level 2,000 feet scattered to broken. Visibility 3 to 5 miles in fog. Occasional ceiling below 1,000 feet overcast and/or visibility below 3 miles in fog until 1000. After 1200 above ground level 3,000 feet scattered to broken, isolated thunderstorms with moderate rain showers. Cumulonimbus tops 35,000 feet.

The following are the Terminal Forecasts issued by the National Weather Service Forecast Office, New Orleans, for New Orleans International Airport:

Issued: May 24, 0340
Valid: May 24, 0400 to May 25, 0300

Amendment 1, 0339. Ceiling 300 feet broken, visibility 2 miles in fog. Wind 200 degrees 10 knots. Occasionally 200 feet scattered, visibility 4 miles in fog and haze. After 0800: 800 feet scattered, 3,000 feet scattered, 8,000 feet scattered, visibility 5 miles in haze. Wind 240 degrees 12 knots. Occasionally ceiling 800 feet broken, visibility 2 miles in fog and haze. After 1000: 1,500 feet scattered, 3,000 feet scattered, wind 240 degrees 12 knots. Occasionally ceiling 3,000 feet broken. After 1300: 3,000 feet scattered, 8,000 feet scattered, wind 250 degrees 12 knots. Occasionally ceiling 3,000 feet broken. Chance of thunderstorms with moderate rain showers. After 2100: VFR.

Issued: May 24, 1132
Valid : May 24, 1200 to May 25, 1200

2,500 feet scattered, ceiling 8,000 feet broken, wind 240 degrees 15 knots gusting to 20 knots. Occasionally ceiling 2,500 feet broken. Chance of ceiling 1,000 feet overcast, visibility 1 mile in thunderstorms with moderate rain showers, wind gusts to 30 knots. After 0300: 1,500 feet scattered, ceiling 3,000 feet broken, wind 230 degrees 10 knots. Occasionally visibility 3 miles in fog. Slight chance ceiling 1,500 feet overcast, visibility 3 miles in thunderstorms with moderate rain showers. After 0600: marginal VFR due to ceiling and fog.

The following convective SIGMET was issued by the National Severe Storms Forecast Center at Kansas City, Missouri:

Convective SIGMET 2C
Issued: 1155
Valid to: 1355

From 50 miles southeast of New Orleans (LA) to 90 miles south of Crestview (FL) to 120 miles southeast of New Orleans (LA) to 110 miles south-southeast of New Orleans (LA) to 50 miles southeast of New Orleans (LA). Area of thunderstorms moving from 270 degrees 35 knots. Tops 40,000 feet.
Outlook valid until 1755.
From Albany (NY) to 60 miles east-northeast of Nantucket (MA) to 120 miles south-southeast of Wilmington (NC) to Orlando (FL) to 100 miles south of New Orleans to Muscle Shoals (AL) to Bristol (TN) to Albany (NY). Airmass quite moist and unstable with a lifted index of minus 15 over the Mississippi Delta into north central Gulf of Mexico. Dew points above 70^{O}F. pushing onshore across the Gulf Coast. Surface heating will be a contributing factor to development of thunderstorms across the Gulf Coast states later this afternoon.

The following Center Weather Advisories were issued by the Center Weather Service Unit at the Houston, Texas Air Route Traffic Control Center:

CWA 1
Issued: 0928
Valid: 0920 to 1100

From 45 miles east of Grand Isle (LA) to 25 miles south of Grand Isle (LA).
20 mile wide solid line of level 3 to 5 thunderstorms moving east-northeast at 35 knots. Tops above 45,000 feet.

CWA 2
Issued: 1130
Valid: 1125 to 1300

From 10 miles south of New Orleans (LA) to 50 miles south-southeast of Lafayette (LA).
20 mile wide band of scattered thunderstorms moving east at 35 knots. Max top above 45,000 feet at 55 miles south of Baton Rouge (LA).

CWA 3
Issued: 1239
Valid: 1235 to 1400

From 20 miles east of New Orleans (LA) to 75 miles south of Baton Rouge (LA).
20 mile wide band of severe thunderstorms moving east at 35 knots. Hail aloft to 2 inches. 50 knot surface winds possible.

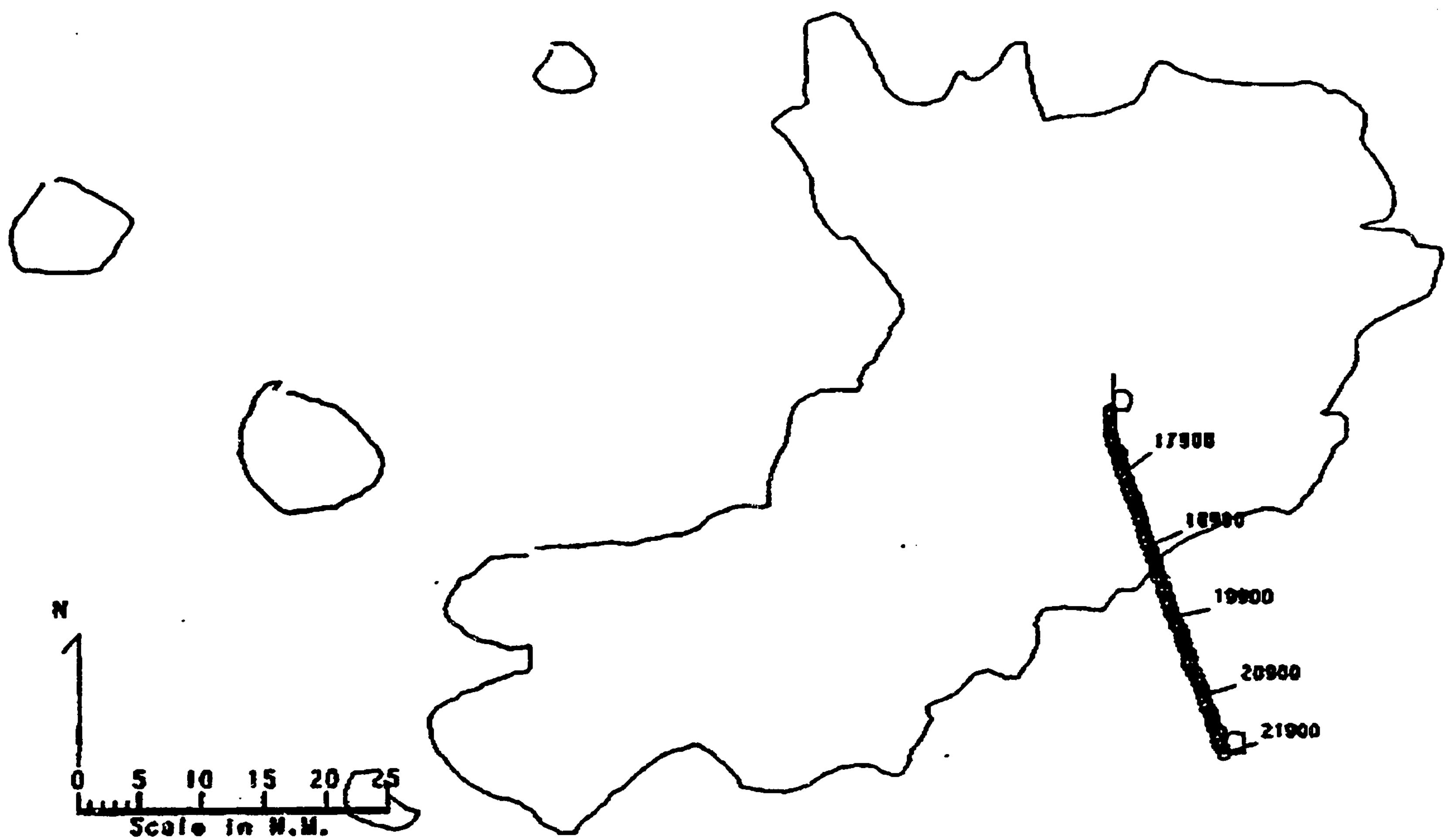
At 1148 the National Weather Service Forecast Office at New Orleans issued a severe thunderstorm warning effective until 1245 for Assumption, northern La Fourche and northern Terrebonne Parishes. This area is southwest of New Orleans.

At 1239 the National Weather Service Forecast Office at New Orleans issued a severe thunderstorm warning effective until 1330 for northern Plaquemines and St. Bernard Parishes. This area is south and southeast of New Orleans and includes the flight path of Flight 110.

[redacted]
James C. McLean Jr.
Meteorologist

WEATHER RADAR : 1242

1238:00.00-1243:00.00 a 1238:36.00
b 1242:59.00



WEATHER RADAR : 1249

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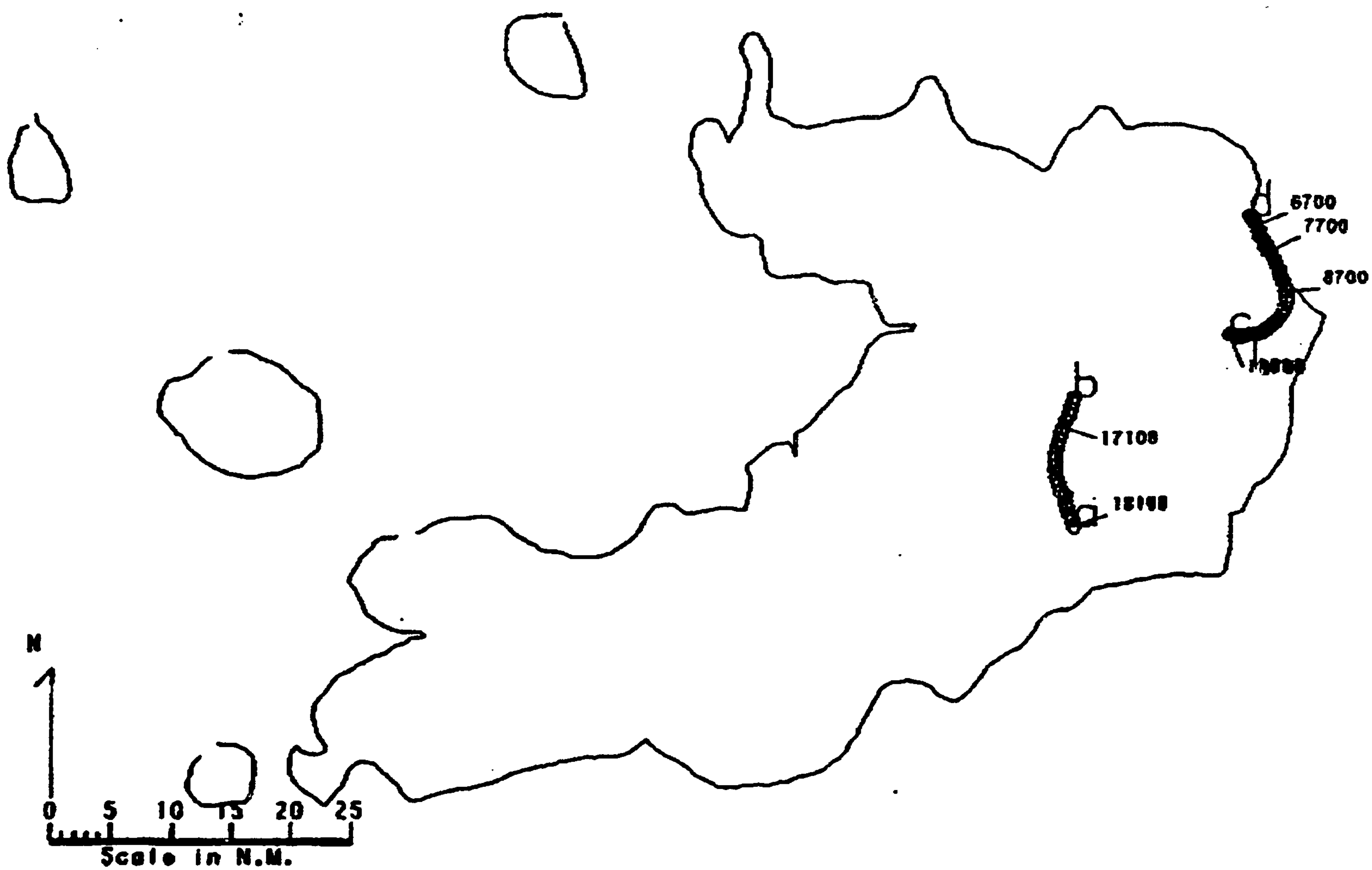
b 1243:41.00
c 1246:44.00
d 1249:57.00



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WEATHER RADAR : 1254

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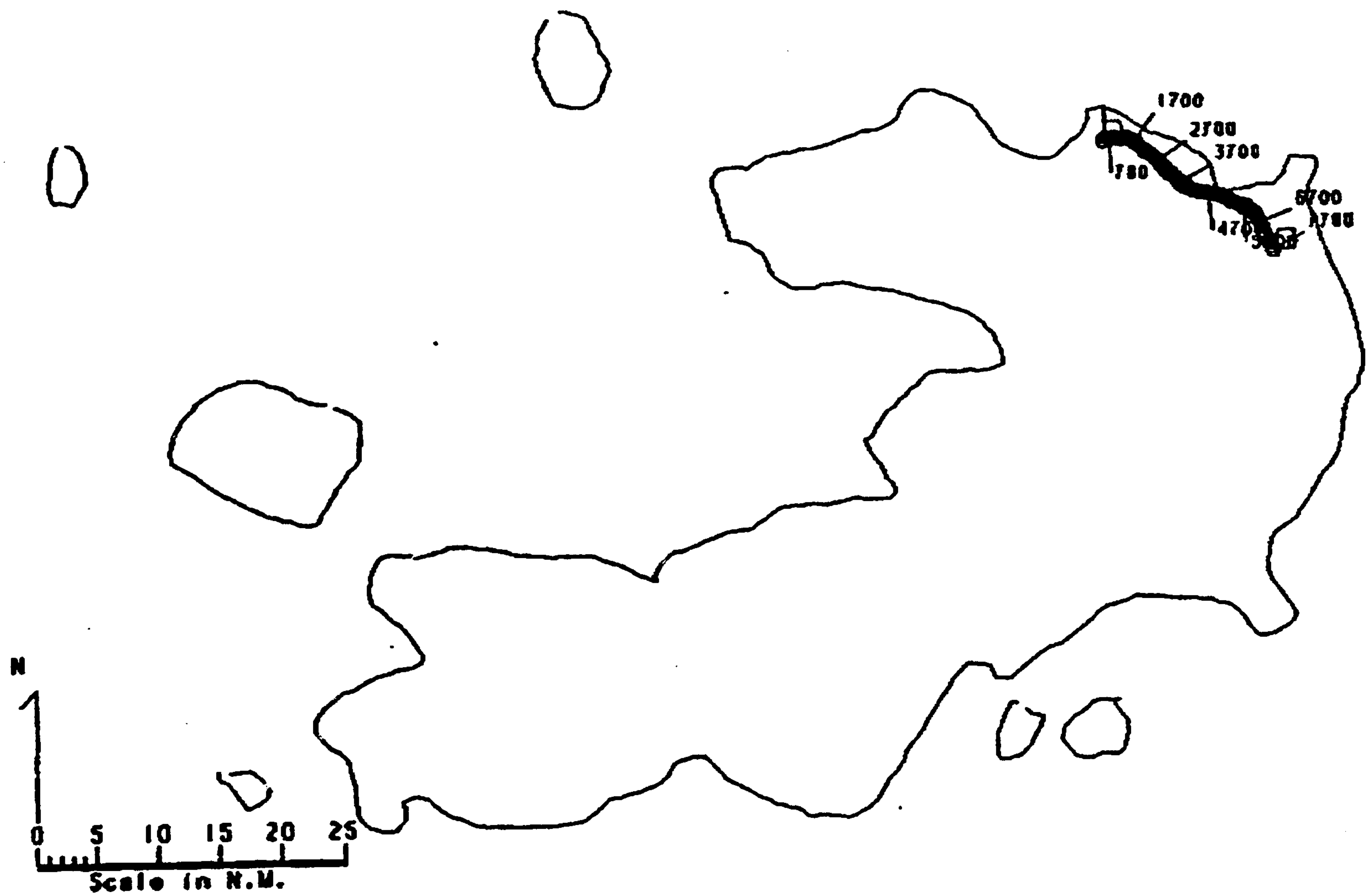
b 1254:57.00



237

WEATHER OVERLAY : 1230

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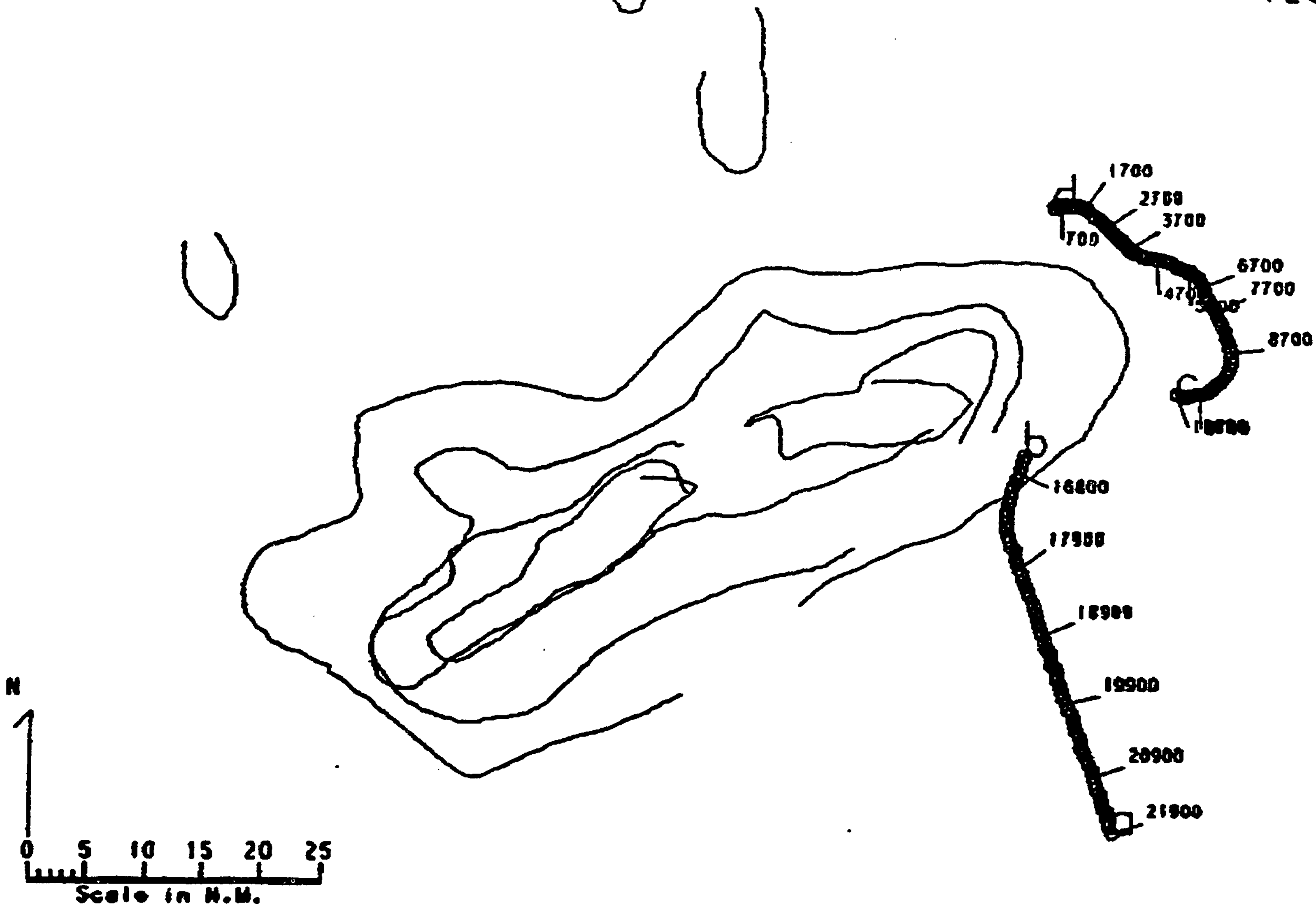
c 1246:44.00
d 1254:57.00



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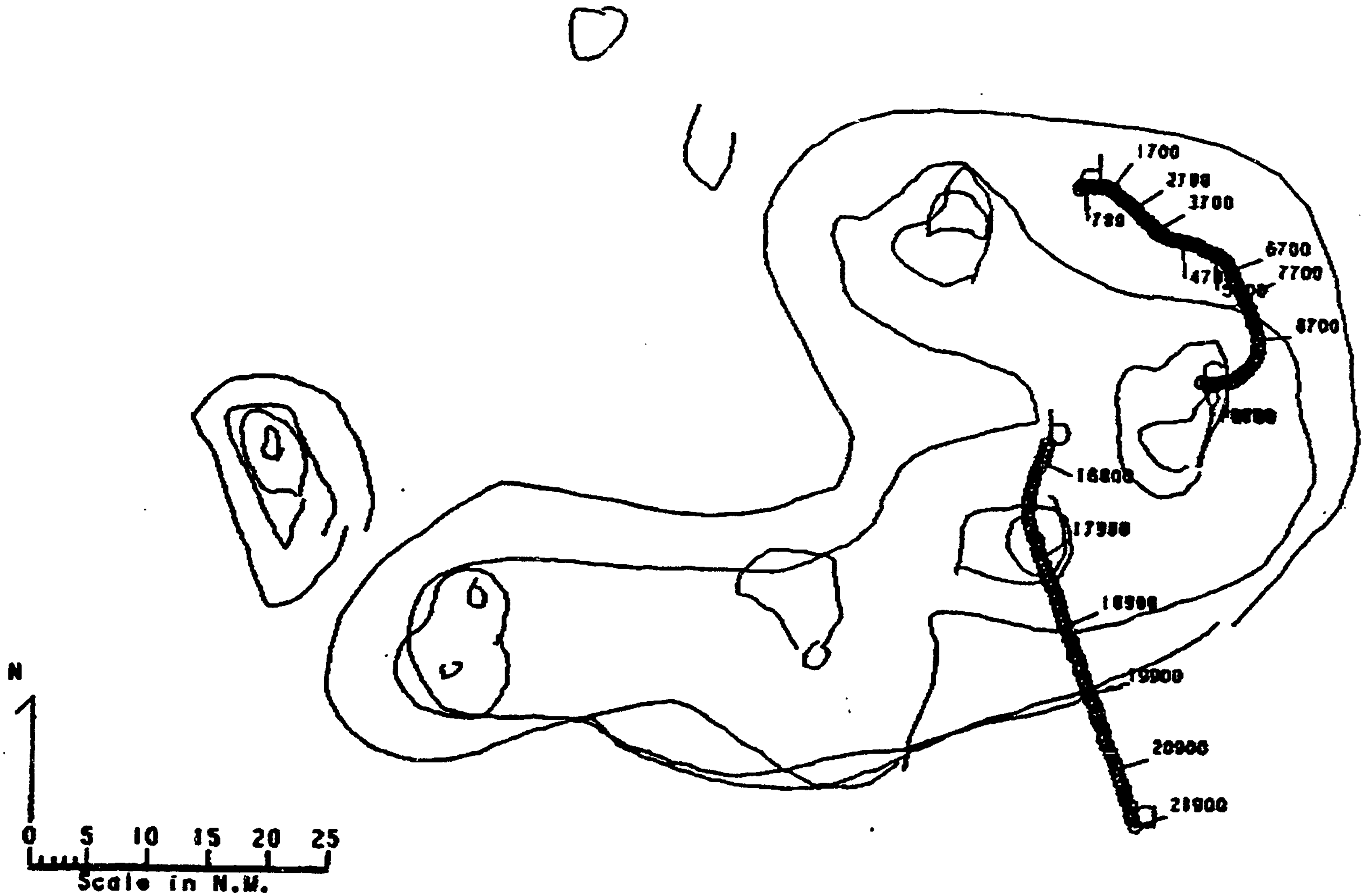
d 1254:57.00



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SEP 29 '88 10:11 GE-EN FLT SAFETY

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Weather – ATC Radar Data Study

NATIONAL TRANSPORTATION SAFETY BOARD
Bureau of Technology
Washington, D. C. 20594

RECEIVED
AUG 2 9 1988
NTSB - FTW

August 22, 1988

WEATHER-ATC RADAR DATA STUDY
FTW-88-MA-109

A. ACCIDENT

Location: New Orleans, Louisiana
Date : May 24, 1988
Time : 1255 Hours, Central Daylight Time 1/
Operator: TACA International Airlines

B. GROUP

Not Applicable

C. SUMMARY

The radar data concerning TACA flight no. 110 was read, processed, and reformatted, then combined with the digitized weather data at the approximate time of the incident, to create a plot depicting flight no. 110's ground track in relation to the weather.

The National Weather Service Forecast Office at Slidell, Louisiana furnished weather information for the time surrounding the incident to the National Transportation Safety Board. The data supplied consists of WSR-57 Network Radar photographs and overlays.

New Orleans Terminal Radar Approach Control (TRACON) supplied the Safety Board with radar data from the Automated Radar Terminal Systems (ARTS) III, for the time interval surrounding the incident, (1238:36 - 1254:58 CDT).

1/ All times herein, unless otherwise noted, are Central Daylight Time based on the 24-hour clock.

D. DETAILS OF INVESTIGATION

The radar data obtained from New Orleans TRACON were read from magnetic computer tape then processed and reformatted at the computing facilities of the Engineering Services Division of the National Transportation Safety Board. The beacon target radar reports and the radar only target reports obtained from the extractor tape were converted from magnetic north to true north and converted from the range (in nautical miles) and azimuth (in degrees from magnetic north) format to an x (in nautical miles East) and y (in nautical miles North) coordinate system. In both formats, the origin is the Airport Surveillance Radar at New Orleans International Airport, Moisant Field.

Observation of the data revealed a gap of 3 min. 3 sec. where no radar data on TACA flight no. 110 is available from New Orleans TRACON. The last hit before losing radar contact was at 1243:41; the next hit was at 1246:44.

The origin of the digitized weather data, for both the photographs and overlays, was the National Weather Service Forecast Office at Slidell, LA. The data was therefore offset by 25.567 nautical miles to the West, and 15.301 nautical miles to the South, to properly align the origin of the weather data with the origin of the radar data. Each plot is labeled with the overall time interval of flight that it covers, the time of the photograph or overlay, and the individual times at key flight positions. Altitude is labeled at each 1000′ interval.

1. Plots of WSR-57 Network Radar Photographs

The times for each of the three photographs from the WSR-57 Network Radar are 1242, 1248 and 1254. The photographs were not of a high enough quality to decipher the different Video Integrator and Processor (VIP) levels of cell intensity of the weather.

2. Plots of Overlays

The times for each of the two overlays are 1230 and 1305. There are contour lines representing different VIP cell itensity levels on the overlays, but they were not labeled, and are therefore not labeled on the plots.

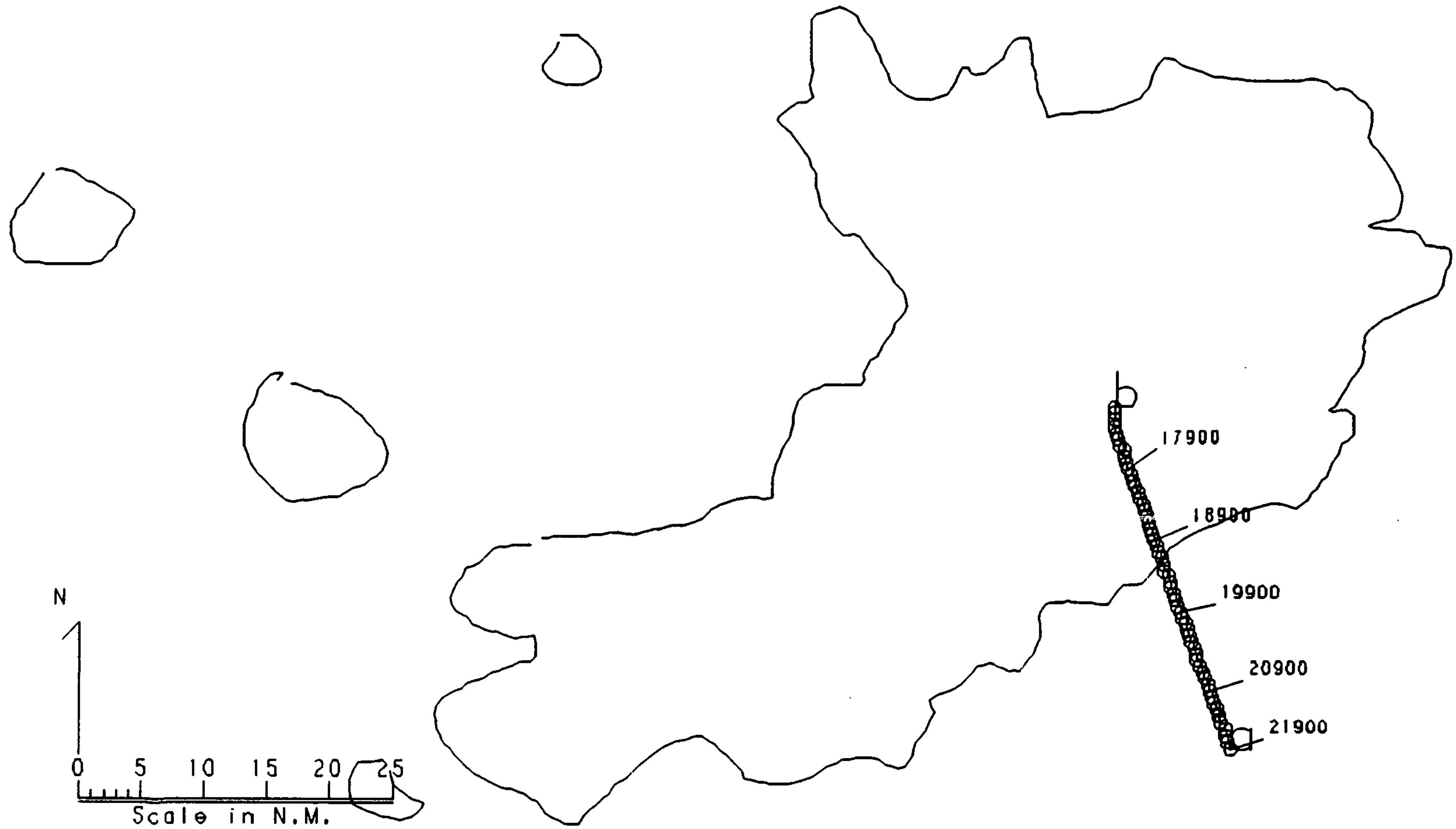
[redacted]
Thomas Jacky
Engineering Applications Programmer

[redacted]
Laura Levy
Engineering Services Division

APPENDIX TABLE OF CONTENTS

WEATHER RADAR : 1242

1238:00.00-1243:00.00 a 1238:36.00
b 1242:59.00



WEATHER RADAR : 1249

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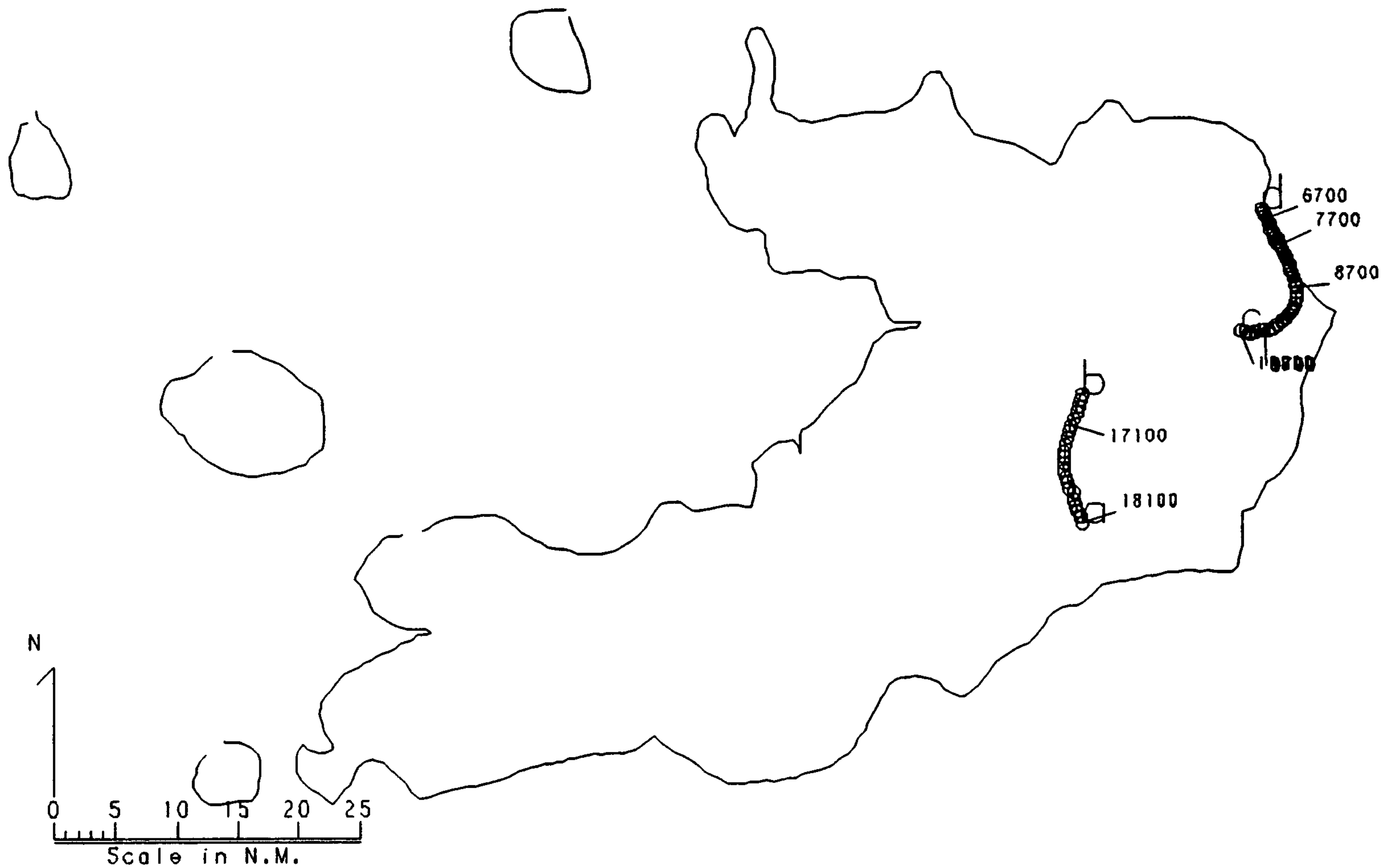
c 1246:44.00
d 1249:57.00



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WEATHER RADAR : 1254

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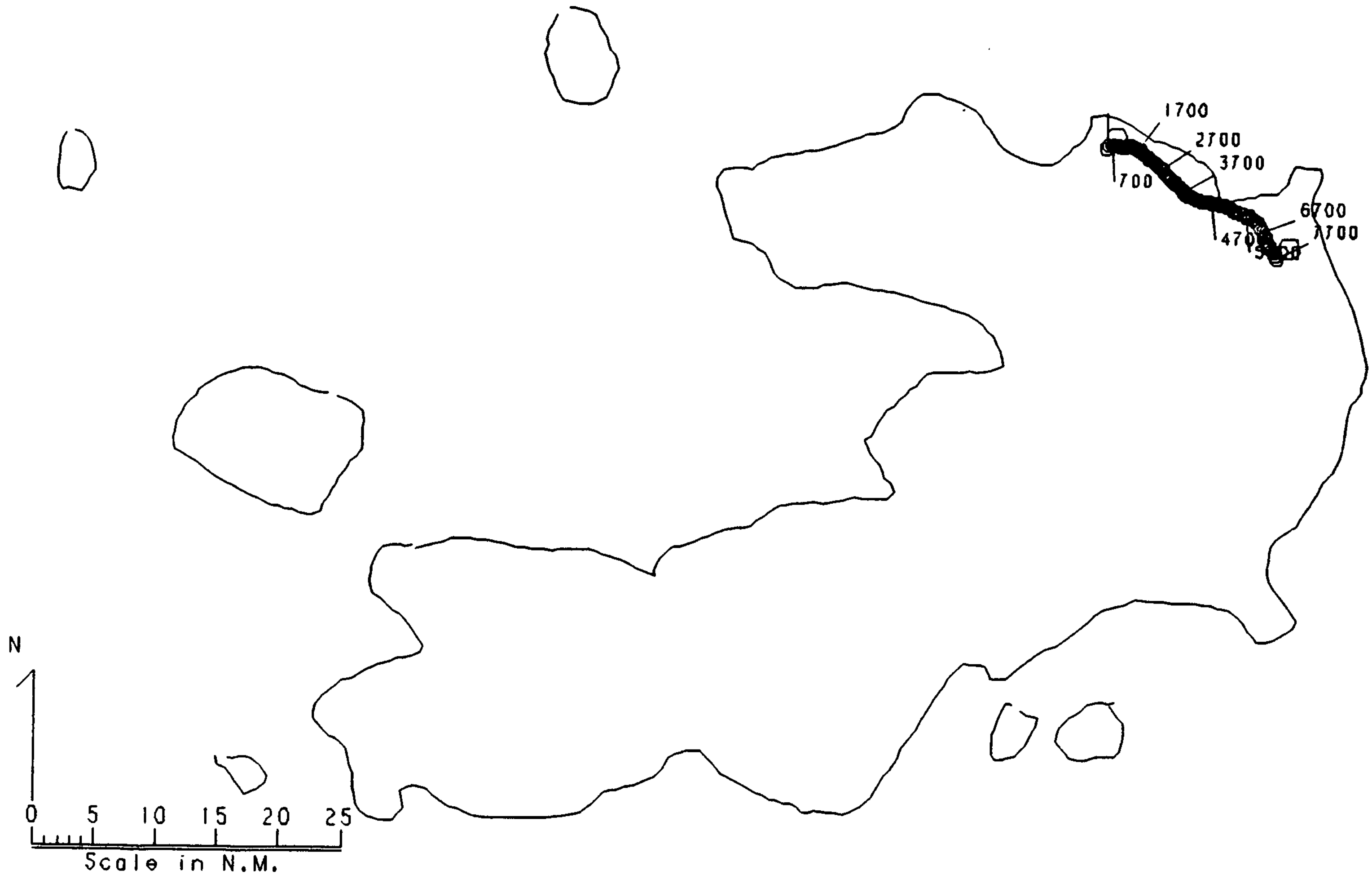
b 1254:57.00



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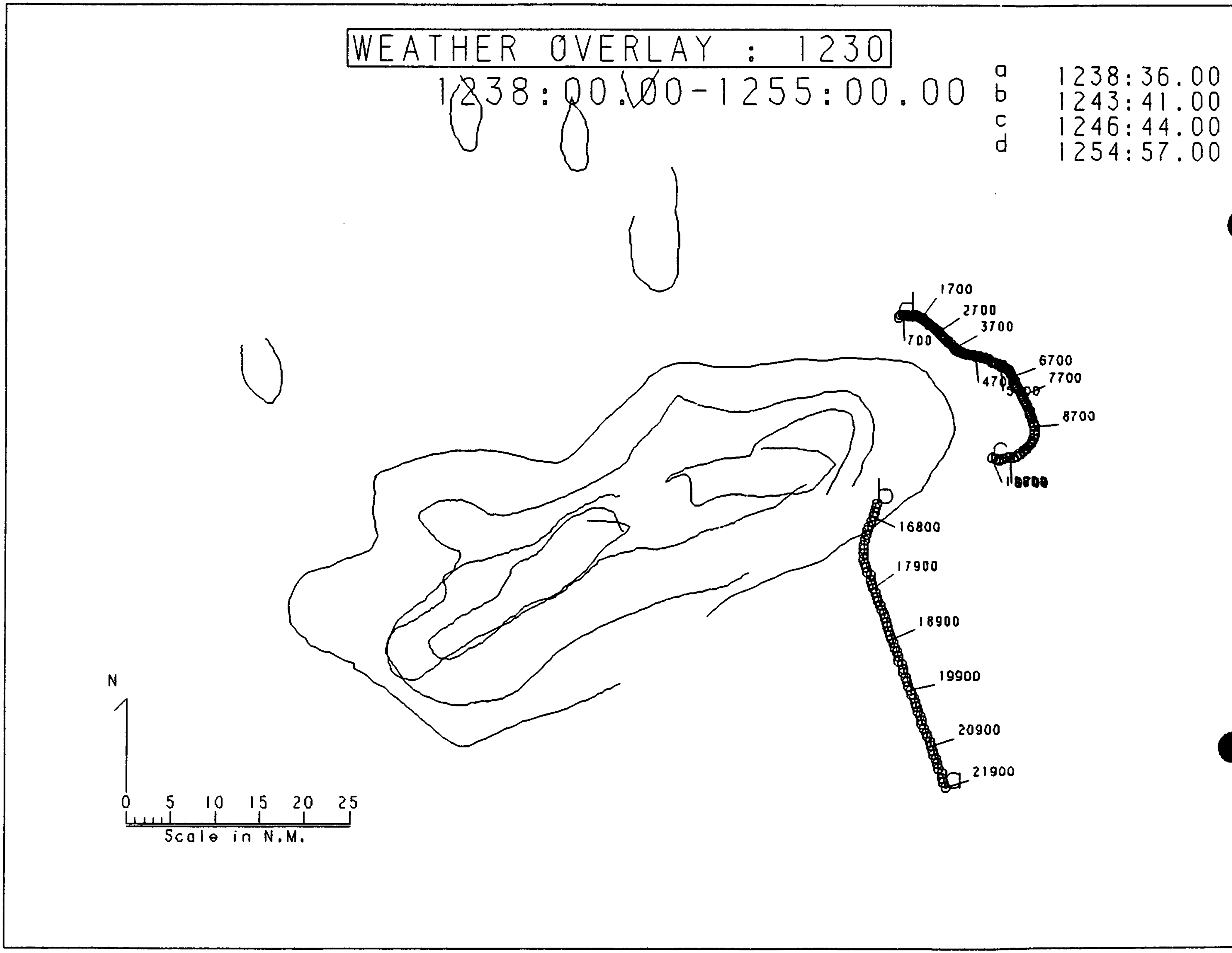

WEATHER ØVERLAY : 1230
1238:00.00-1255:00.00
a 1238:36.00
b 1243:41.00
c 1246:44.00
d 1254:57.00
700
1700
2700
3700
6700
7700
8700
16800
17900
18900
19900
20900
21900
N
0 5 10 15 20 25
Scale in N.M.

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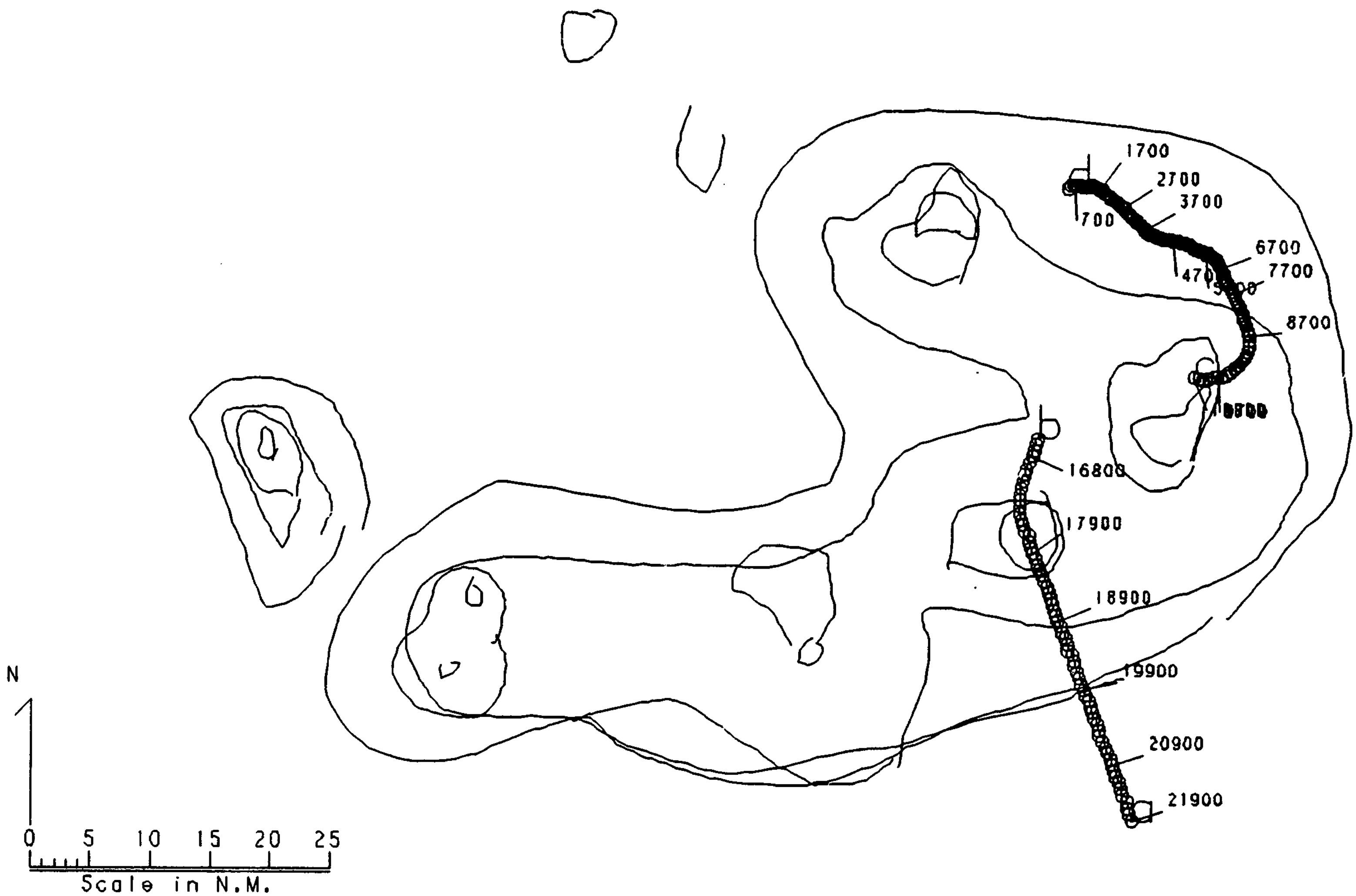
WEATHER ØVERLAY : 1305

1238:00.00-1255:00.00

a 1238:36.00
b 1243:41.00
c 1246:44.00
d 1254:57.00



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Crew Interviews

TRANSCRIPT OF INTERVIEW JUNE 17, 1988
RE: TACA FLIGHT 110

[NOTE: The recorder was not turned on at the commencement of the discussion between Mr. Cherry (DKC) and Mr. Wandel and the FAA representative, Mr. Potter, which outlined the use immunity granted to all of the interviewees, Captain Dardano, co-pilot Beltran-Lopez, and Captain Soley. The tape begins at the end of the discussion as follows.]

Wandel: Anything that comes out in this interview the FAA cannot use to violate or take any action against the crew. Any information which the government does not develop then they would have to develop that information separately.

DKC: Nothing on this recording in this interview can be used in any other proceedings. That is our specific agreement.

Wandel: That's correct. It is to be used only directly for the NTSB investigation. What I would like to request is that when we finish the tapes today as we take each person's statement we would like to as you go through each person identify themselves when they ask a question or at the beginning of a series of questions and then what I would like to do at the end of the tape is have the tapes given to Mr. Cherry here because he probably has the best facilities to transcribe them and then let the crews review them. Sign them and return the original tapes and the original statements to me and then I will make distribution of the transcripts, not of the tapes but of the transcripts.

DKC: Sure then they have the opportunity to change anything. For the record here we have got no interpreter and their native language is Spanish. So here's what I understand, they will be given the opportunity at any time. . . .

Wandel: At any time

DKC: to correct any errors.

Wandel: At any time that they feel that there is additional information that they think is pertinent to the investigation and want to introduce into the record, they are certainly allowed to and that's basically NTSB investigations are never closed. They are always open.

DKC: With those understandings, let's begin.

Gorney: Carlos, for the purpose of the tape, you want to say your name.

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Dardano: Okay my name is Carlos Antonio Dardano from Salvador, captain for TACA.

Gorney: Okay you were the captain of Flight 110. Is that correct?

Dardano: Yes sir on May 24.

Gorney: Carlos, could you go back in time to just prior to the descent out at 35,000 feet into New Orleans and can you just recap up to that point what your perceptions were of the weather in New Orleans both from what you saw, what you heard on the air traffic frequencies and what you had in your dispatch documentation.

Dardano: Okay. We were flying 35,000 feet. We were all the way up to, I guess, 100 miles out of New Orleans. More or less it was beautiful, you know, completely VMC VFR over there, blue skies and we started looking some, like you know, front. And the New Orleans area. But it wasn't nothing out of usual weather. (Unintelligible portion) I got the radar on 150 miles at the beginning. You know, when I start my descent I put on 50 miles.

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Gorney: So you started your descent headed over 50 mile range. And what did you see at that point in time?

Dardano: Okay it is a color radar, okay, so it was between green and yellow, and some cells - red ones. Okay and that's why we got some deviation to the right of our course about 5 degrees so try to get away from that heading weather. But . . .

Gorney: Was it a large area of green and yellow?

Dardano: Oh yeah, it was. It was, you know, the cells were red. It was, you know, points.

Gorney: Could you visually spot cells just as you were making the descent out of 35,000? What did you see visually as far as buildups?

Dardano: Well, since we start descending, we start getting clouds, you know.

Gorney: Uh-huh

Dardano: That's when . . .

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Gorney: But before, while you were at cruise altitude, could you see buildups?

Dardano: No, not really. Looks like a line, you know.

Gorney: Oh.

Dardano: It was already dark, that means it wasn't moving up, you know, like beautiful snow, like that white one really looks nice. It was dark so that means precipitation already. So once it was, I didn't see the white ones around, so it was dark ones.

Gorney: What altitude did you first go into the clouds were precipitation?

Dardano: Well that was really just, I don't talk very good, but we were like coming in, coming out, coming in, coming out, you know.

Gorney: While you were doing that, was it light precipitation, moderate?

Dardano: No, no, we just started getting some icing condition. That's when I turned on the anti-ice, you know, I got in on continuous.

Gorney: You had it on continuous ignition.

Dardano: I got it on continuous ignition, I got it on the anti-ice, okay, during the descent. I say since 28,000, something like that, 28,000, you know. Coming down.

Gorney: Could you just briefly describe the autopilot situation at that time?

Dardano: Okay, we were kind of, you know, like being, I don't know (unintelligible portion) and then, when they say okay you start to descend, and the tower says start this descent now, okay, and we were just steered a little change, you know, we had a little change (?) (unintelligible portion) on 280 and we were to, I don't recall the altitude right now, but we got it on the autopilot. Okay.

? Did you have the autothrottles on?

Dardano: Yes, autothrottles were on.

? Did you have (coughing masks words) on?

Dardano: What's that, sir?

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? Do you remember the speed you had dialed . . .

Dardano: 2 8 0, 2 8 0. As a matter of fact, I put it on the MSFMC, too. I just put on the FMC, too and I was doing it on the autopilot but I got it on that one, too.

? You had it on the dial at 2 8 0 (unintelligible)?

Dardano: Yeah, I got it on both places.

Gorney: Carlos, at what point did you first start encountering moderate type precipitation? Do you remember altitude wise?

Dardano: No, I really don't remember but for what I can recall it was just right before we got the flameout on the engines. We didn't have nothing at all, really. Just had a regular descent coming in.

Gorney: Why don't you go ahead and describe with as much detail as you can the weather conditions as they were changing. Throw in an altitude if you can, and if you can remember it, where things started deteriorating, you know.

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Dardano: Well, I as I say, I guess we would start deviating, okay. We were in the weather, it was clouds. The radar paints some red, yellow, green.

Gorney: And the red was off the left.

Dardano: Off the left. And we had some cells off to the right, too. Okay. But we were pretty good on the (unintelligible words) put it that way, we were always trying to avoid bad weather.

? Were you getting a relatively smooth ride?

Dardano: Oh yeah, yes, beautiful, I mean, you know.

Gorney: Okay, let's go ahead to when it started to getting a little rough and why don't you describe that. Both from a turbulence point of view and precipitation.

Dardano: I can say it was a big surprise to all of us, you know, we just started and there (makes sound); thirty seconds or less than that, you know we just went boom, down.

? This was just before the flameout.

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Dardano: Yeah, but that time, you know, we just say * * *. You know what going on. I mean, and they say uh-oh, they will complain about the paint, you know. The paint of the airplane.

? (Unintelligible overlap of questions)

Dardano: No but they started getting really bad rain, you know.

Kriha: Heavy rain

Dardano: Said * * *, how you like that.

Kriha: How does the rain compare . . .? How does the rain compare to your past experience in flying throughout Central America?

Dardano: You know tropical weather in Central America is worse than this.

? Operating (unintelligible)

Dardano: We have been in worse conditions. More time than that one, you know. We go to Tegulcigalpa daily, we go to Guatemala daily. And that's 100 miles wide, and you don't have much to avoid. I mean the facilities there:

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are one VOR, one ADF. If you are VOR, you are 25 out of the airport, about 25 miles south, and the weather changes quickly all the time so you just have to maintain your headings and you have to try to get there as closely as you can, you know, because of the ceilings.

Kriha: Do you recall what color radar, what color radar was as you entered this area?

Dardano: It was yellow.

Kriha: It was yellow.

Gorney: Did you ever at any time then look at your weather radar and see that you were in red?

Dardano: No, in the red. I never got in red. That I know. I might but after the engines went out. Because I didn't know where I was going, you know, look at the magnetic heading to see which heading we were going, you know, that sucker was all over the place. So I was trying to, you know, I recall that the bad weather was on the left side so I was just flying the horizon here because I got flags all over the place and I see that this (unintelligible) three three twenty stuck, 320, you

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know, and the other one over here the small one he was (makes sound) like that you know. I don't recall which speed I got on that one. Then the altimeter was going like a little washer (makes sound).

Gorney: How many seconds was it approximately before the flameout that you really started getting jostled around?

Dardano: I say 15 seconds.

Gorney: 15 seconds.

Dardano: Yes. You didn't even have time to say, you know, like I say we say, **** the paint. And that was it and then boomp, we going blank and the electric, you see.

Gorney: Did the heavy rain and hail and the turbulence. Did all that start at the same time? You started getting jostled around?

Dardano: Right. Everything was back together. Heavy precipitation, then we encountered some (two unintelligible words) and lightning.

Gorney: Lightning?

Dardano: Yes, at the same time. You know, everything was the same way, I mean you got red, you got yellow and you got green but I was far away from my route here so trying to get back to New Orleans, you know, was red, I mean green and yellow stuff there so you can go through, so, you know, it was all over the place the same thing, you know, so much weather we get here. I don't see why not. It's regular condition that we run into, you know, we do it all the time.

Gorney: Just prior to the, what about the time that you ran into rain, heavy rain and turbulence. Do you remember how the, what was the N-1 doing at the time of the power, do you remember how that was sitting?

Dardano: No, to be honest no.

Kriha: Do you recall if the autothrottles were in the outset?

Dardano: We got to change, they were giving us some approaches for 19 back course localizer at the airport but I think due to the descent they say you clear for a 28 approach, you know, I listened to a 28 so I was putting down in the computer and I was, you know, getting my charts out of there and trying to study that. So

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between that I wasn't putting much attention on the panel, face of the panel of the engines. I was doing, you know, flying the airplane, seeing the weather and all that you know.

Kriha: Yes, Captain Lopez or Captain Soley, do you remember what the autothrottles, where the throttles were as you went into this heavy weather? Sir, how about you? Do you recall the flight one enunciator what it showed up, did it show armed, or did it up on the FM panel, up (unintelligible)?

Dardano: I am pretty sure they were armed?

Kriha: Basically they activated (unintelligible).

Dardano: Yeah because I remember that I had my hand on it, you know. I was just following what they were doing.

Kriha: You were following what they were doing.

Dardano: Yes, with the hand. You know . . .

Kriha: Were they moving a little bit, the throttles?

2b1

Dardano: Well I don't know, it's too hard to say, you know. You mean at the time of flameout or just before that.

Kriha: Just before that.

Dardano: Just before that? I don't know.

Kriha: Let me back up.

Dardano: (Overlapping, unintelligible) power of the thing, you know, you mean that exactly time, I believe. Is that what you mean?

Kriha: Or at some time just prior to it or at the flameout do you recall that the throttles were doing.

Dardano: Like I say, you know, we were on descent so they might be back to high idle, because . . .

Kriha: You were clear to 4,000 feet, right?

Dardano: We were clear.

Kriha: Did you have that set up on the remote control panel?

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Dardano: Yes, okay, so from that point when we got into the red what happened was then I don't know. I don't know if when the speed we were we started getting some bump and I guess wind in the thunderstorms or something, and the speed went up, I don't know.

Kriha: (Unintelligible, overlapping question)

Dardano: Oh yeah, because I recall that when we saw the air speed was 320 when we got the flameout; I recall that because that was the first thing I started looking at and then I see the airplane wasn't going 320, you know, you can really say okay I am going fast or not, and I say "Okay its the electrical that's gone, we lost electrical total, you know, and then I say hey you ******* ******* we don't have any power. That's the words that I used. We don't have any power. This thing is serious, you know. That's when I told Captain Soley, you know, "Hey, restart the engines."

Gorney: When you realized you didn't have any power, what made you realize it. What was the feeling you got that you didn't have thrust as in engine power, not electrical thrust.

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Dardano: We were on the plane you know, and I say we lost all the electrical, I started thinking in my mind about the inertia (?) and all that, how to get it back, you know, we are in real trouble. I turned around and said record the electrical, you know, to the first officer and I looked all over and I don't know what I saw, but I saw something that wasn't what it was supposed to be, you know, and I said, Arturo, I said look over all the instruments, you know, and I went to check all the panel on the engines and I decided I don't have power, see what's going on, you know.

Kriha: Do you recall what you saw on the EGT gauges?

Dardano: No.

Kriha: How about N-1?

Dardano: No, I don't recall. No I don't recall any numbers. I recall that I saw, so I decided it was the power because I think the airplane wasn't flying at what the instruments say. They got 3 2 0. You know, when you got 3 2 0 (unintelligible).

Kriha: Was there a sudden down draft, just before (unintelligible)?

Dardano: I guess so. Not just before

Lopez: (Overlapping answer) We lose everything in the instruments so. . .

Kriha: Did you feel yourself lift against the seat belts? Or were you just bouncing all over the place or was it hard to tell?

Dardano: Not that hard but we were bumping, you know. We got worse after the flameout, it was worse conditions.

Scott: At that moment, Carlos, what did the controls feel like when you lost the electrics? Were they starting to stiffen up at that time?

Dardano: Honestly, Scotty, I don't remember. I guess they started to die out, you know, but I don't recall after that because I never remembered that I was thinking about losing it. I didn't even think about losing the hydraulics, you know.

Kriha: There were no hydraulics involved.

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Dardano: Yeah, I was windmilling, I know that but I didn't even feel it that bad, you know, so I was.

Kriha: You probably wouldn't even feel any difference unless there was rapid control of an engine.

Dardano: But I know, then I start, you know, we start immediately went to fly then. We start to fly the magnetic course, the magnetic compass, to try to see where we were. I started getting down to the right of . . .

Kriha: Why did you go to the right?

Dardano: Because I had the bad weather on the left. I remember the red thing on the weather was this side (left), this other part was pretty good. To my knowledge on the radar. So that's why I tried to get over there.

Gorney: Was there a mode on the weather radar that you had selected. I am not real familiar with the columns but what was the mode that it was in. Weather selector?

Dardano: What?

Gorney: Weather?

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Kriha: Do you recall antenna tilt? Do you have a standard procedure do you have to kind of search the . . .

Dardano: Yeah. It all depends on what the . . .

Kriha: You have to do the with the airplane . . .

Dardano: Yeah

Kriha: Do you recall basically what you had; if you were looking down, or looking up, or looking about level with the radar antenna?

Dardano: No, like coming down I got to tell it to maybe have (unintelligible)

Kriha: A couple of degrees nosedown.

Dardano: Either that or the same nose degrees.

Kriha: That's the way I usually operate.

Dardano: Yeah, that's the way we usually operate it because when I put the throttles, you know, I say * * *

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(unintelligible) and then I started getting a little bit concerned about it. (Laughter) Say, where to go?

(Garbled)

Dardano: I say where's the airport. Where can I land down? I don't want to go into the sea.

Gorney: Okay, I guess before we go any further in time here. The flight. Are there any other questions?

Schjoneman: One question. When you entered the icing conditions and turned on anti-ice, just turn on the engine or the windshield(?)

Dardano: No, we didn't have the windshield anti-ice. It wasn't that bad. We just turned it on, just the engine because what's on the windshield is just little bits of the regular thing. When you started picking up you just go ahead and put it on, you know. When you are not in a bad situation of weather.

Schjoneman: So throughout the whole flight or part of it (unintelligible)?

Dardano: What's that?

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Schjoneman: Cliff Schjoneman, Boeing, the question is, the windshield(?) anti-ice wasn't used at all during the entire flight?

Dardano: No

Mihalchik: Mihalchik, G.E., did you notice, did the engines go to high idle when you selected cowling anti-icing mode. Did you recall the engine speed coming up?

Dardano: Yes they went up.

Mihalchik: Okay, they did go up.

Gorney: Did you use speed breaks any time during the descent?

Dardano: Yeah

Gorney: When?

Dardano: Right when I was trying to get to a speed.

Gorney: So this was just before you thought it flamed out?

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Dardano: No, that was way before.

Gorney: Okay

Dardano: You know were at 35 and they say hey TACA start descending, I say okay we are going down. Then I got the speed brakes on after I got to 280. I was just descended about 2,500 feet, 3,000 feet per minute down . . . .

Kriha: When you were initially coming in on New Orleans approach, you were on L Nav, V Nav course, right?

Dardano: Yeah

Kriha: So when he started vectoring you off, would you have a V Nav disconnect, did the CWS pitch come up on your enunciator. Why did you go to a flight level change?

Dardano: Because we started descending and we want to, deviation to five degrees to the right of the course.

Kriha: The V Nav disconnects automatically if you get off ___________. So the autothrottles were going the speed, the same speed?

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Dardano: Right.

Schjoneman: You initiated the whole descent as a level change.

Dardano: Yes. Because we started getting to, you know, deviation.

Schjoneman: Sure that's what you have these for.

Mihalchik: Then basically you didn't really do anything with the throttles prior to the event and there was no reason to _________ were still maintaining air speed.

Dardano: Right, the first time I recall I used the throttle was after the flameout myself and I went to push it.

Mihalchik: The autothrottle was disconnected.

Dardano: Yeah, disconnected. Then when I saw that we didn't have the power in any of the engines that was the first time I recall.

Gorney: Carlos, did you hear on the air traffic frequency anything about a SIGMET?

Dardano: No.

Gorney: Did you have anything in your dispatch paperwork about a SIGMET?

Dardano: No, not that I recall.

Gorney: Okay.

Franklin: (FAA) Carlos, in any of your training, previous training or recent training at American did anybody ever discuss maintaining a higher power setting during heavy precip to prevent any flameouts. Was that ever discussed ________?

Dardano: No. It specifically said "trying to say careful with bad weather?" Not that I recall. It might be somewhere in the . . . .

(Unintelligible)

Dardano: Yeah, you know the 200 series when you put the engine anti-ice you go to 55% on the N-1 to spool it up. That's what we know.

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Gorney: Is there any where in your training and specifically in American Airlines, were you made aware of that operations manual bulletin. I think it's 87-7 about penetrating heavy weather.

Dardano: Let me ask you something. What does that word mean?

(Unintelligible portion)

Dardano: You mean that if they specifically . . . .

Kriha: What it says turning anti-ice on and start switches to fly.

Dardano: Autothrottle . . . ?

(Unintelligible)

Kriha: If I recall Jeff, it just says to put the anti-ice on and start switches in flight . . . .

Gorney: That's correct.

Kriha: It doesn't say anything about autothrottles or N1.

Franklin: . . . . We put out a bulletin after the Georgia Southern Airways crash about the power during heavy precip but this my question was if you were already in the precip and the engines quit, then as soon as you get in the precip you can come up with the power but if it happened prior to that they are already flight idle, high flight idle (unintelligible). We did have a bulletin and my concern was whether or not our people were teaching this to everybody going to school around the country. Unintelligible.

(Unintelligible discussion)

Gorney: Have you ever seen that bulletin. Let me ask that question.

Dardano: No.

Gorney: No.

Dardano: Yes, see it. Read it, no.

Gorney: Were you aware that it was in your manual? Operations manual?

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Cherry: Prior to this incident?

Gorney: Yeah, prior to the incident?

Dardano: Aware? Be sure I read it on the manuals?

Gorney: Yeah, were you aware that that bulletin was in your manual.

Dardano: I may have saw it but I don't recall it.

Gorney: About training. When was the last time you had training, specific training on the use of weather radar?

Dardano: On the what?

Gorney: On the weather radar?

Dardano: Training? At the summer school, you mean?

Gorney: At any kind of school, any kind of formal school.

Dardano: Well, you know, when they get new equipment and all that we get briefing how to use the new equipment and all that so we just got instruction . . . .

Gorney: Did you get any differences training, 300 differences?

Dardano: Have to use the word on papers, no.

Gorney: So the last time, correct me if I am wrong but the last time you would have weather radar training specifically was when you had recurrent training in the 737. Is that right?

Dardano: No, because like this one was new equipment, you know, we just went to briefing, the school over there, ground school. How to use our new radar.

Gorney: When was that?

Dardano: It was a couple of weeks before we got in the airplane.

Gorney: Before you got into the 737-300?

Dardano: We know how to operate the old ones, 200 series, but on this one 300 we just went to the difference between this one and the other ones.

Gorney: The weather radar on the 300, were you satisfied with this performance?

Dardano: Yeah.

Gorney: You like that weather radar.

Dardano: I believe its pretty good. We have other ones just green, light green . . . .

Gorney: Have you ever had problems in the past with that weather radar where it showed light precip and was heavy precip. You know a problem like that. Have you found it to be an accurate . . . ?

Dardano: Not specifically with this one but I have with some other ones. You know that they say that it's not exactly what you find it there.

Gorney: Are there any more questions about up to the point in time when he realized he had power loss? Because then if not I am going to get into that next segment. I think Cliff has a question.

Schjoneman: Well actually, this one might be the start of the next segment. It sounds like when you were talking about the power loss that it happened very quickly, everything went down. I just wanted to try to verify when you lost electrical power and the panels were blank, it just went, you didn't get a flash like maybe one generator tripped off.

Dardano: No. No.

Kriha: In other words you didn't get bus transfers or anything like that? It doesn't have a simultaneous . . . .

Dardano: No. That's what surprised us, really because, you know, sometime . . . .

Gorney: At the same time.

Dardano: You can get like you say, you know, "We lost one generator, what's going on", you know, thirty seconds after you lost both? No.

Gorney: How long was it from the time you realized you had an electrical problem to the time you realized you didn't have engine power.

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Dardano: What, 15 seconds, 10 seconds. How long it takes to go back over there, you know (indicates noise).

Kriha: Did you try to put the engine generators back on the line, then. Did you have the blue lights (first tape ends)

Gorney: Okay, I guess, Captain, I am going to let you go ahead now and describe again, tell a little story if you will about, what I would like you to do is start from when you realized you did not have engine power, what you did, what you delegated, we are very interested how you delegated who to do what and how you, who did during this restart process. Up until how many times you tried such and such and can you step through that, then we will probably, I am sure, have a lot of other questions.

Dardano: As soon as I realized that the fail that we got, Captain Soley was on the jump seat there, so I asked him, or I told him, to try to restart the engines. I told Captain Lopez to help me, and I was flying the airplane, you know. Then they started the (?) . . . trying to control the airplane, trying to fly out using the standby horizon on the airplane, because there was flags all over the place, I trust, you know

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the standby horizon. I was mainly looking at the little one. Then I recalled deviating trying to make a right turn. Between that I recall what with the flags, got back some electrical.

Kriha: Reach up and start the APU?

Dardano: He did.

Kriha: Captain Soley did?

Dardano: Yes. I told him to do it. I didn't have time to look over, no place, I was just. Then it started getting a little worse, bumpy and all that. I saw how we got the electrical back and I told him to tell the tower of our conditions. Where is the closest airport? How to vector to the closest airport? I don't remember if we called them and say what the distance is and what vector to New Orleans. And I asked for the distance, I don't know, for the weather, but anyway the weather and the distance was (?). Lakefront was raining. This other airport I don't recall the name of it he was giving it to me, because we asked for two or three airports but every airport was under rainy conditions. I was trying to get out of the rain. For about 5,000 feet we got out of the rain, right over this lake, and

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by that time I called Captain Soley, okay you start getting back number one, number one is starting. And I say okay, tell the tower that we got number one back, request some vectors to New Orleans and declare an emergency. We already declared emergency . . . .

Kriha: You broke out of the weather at 5,000 feet?

Dardano: Somewhere around there.

Kriha: Was it still raining down there?

Dardano: Yes

Kriha: Underneath the clouds?

Dardano: But it was like rain, but this time we were getting out, going southeast, southeast, yes? Back towards that place. And we broke out just over this lake. I don't remember the name of the lake.

Kriha: Lake Borgne?

Dardano: Yes, something like that.

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Gorney: How long in minutes, if you can, in minutes and seconds were you in really strong turbulence and rain, heavy rain. One minute?

(Unintelligible)

Dardano: We got in the rain. But . . .

Gorney: I mean the really heavy stuff.

Dardano: Just right when the engines quit. I don't know, after that, it was okay. Then we say okay. Let's vector back to New Orleans and the tower called and said switch to 327 heading and maintain 5,000, vectors, for so on to New Orleans. Then we were supposed to have number one engine running by that time. I recall Captain Soley saying okay number two is coming back, we got it, you know, we got it, okay. "Tell him that we got both engines and we just need you know," then Captain Lopez says "thank you very much" and all this, vector back to New Orleans and we got everything back to normal. When we start, but by this time I was really looking all over the place and just saw water, and grass that you see around the canals here. And the lake, by that time I remember I say when I start pushing forward and say "hey you guys we don't have

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anything." I went about three times on the throttles; I say "look at that." "We don't have anything."

Gorney: Let me stop you right here.

Dardano: I never (unintelligible)

Gorney: Just prior to you advancing the throttles, you found out that you didn't have engine power did you see EGT or N1, or . . . .

Dardano: We saw it. As a matter of fact we saw EGT went (noise indicating up).

Gorney: Maybe we can start with Captain Soley or Lopez about the restart attempts, if you want to go into that.

Dardano: You want me to go all the way down.

Gorney: For the record, I am interested in your landing but I don't . . . .

Dardano: I can say and then Captain Soley can say.

Gorney: Okay if you want to go ahead and finish.

Dardano: You know, at that time when I say okay we don't have anything I told them we don't got anything. I was looking by that time and I am going to crash this sucker, where to put it. Then I got the radio and I start talking to the tower, you know. I was looking for the lake, I remember the lake was over here off to my left but I like that canal because I thought it was closer for us when we were going in the water, or whatever.

Kriha: There was just parallel where you actually landed.

Dardano: Yes

Kriha: Did you have the EGT overtemps occur right down at that low altitude area; did you think "I just can't continue on and the engines won't start" or did you have an overtemp and then the red lights came on?

Dardano: Yes

Kriha: Is that why you concluded you didn't have any more power at that point.

Dardano: Yes, we shut it down right away.

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Kriha: Because you got overtemp.

Dardano: Yes, overtemp.

Kriha: Both engines or one engine?

Soley: Number one first, number two second.

Kriha: This was down below 5,000 feet.

Soley: Yes (remainder unintelligible)

?: Go ahead.

Dardano: That what was when I say, "he put it back again." That's when I say okay we are going down. I talked to the tower and say we are gliding down. We lost power in both engines, we are gliding down. "Where do you want me to put it? (Laughter) Really I was going down so I was expected to say "okay this is a good place or this is not." And he say something about I-10 and I misunderstand that little conversation with him, he was trying to tell me not to go to I-10 and I was thinking he was saying go to I-10 and I said uh-uh, no way.

Kriha: Did you see it?

Dardano: No, I saw the bridge. You know there is a bridge right in front of that canal.

Kriha: That's the way I interpreted from my listening to the tapes that he was trying to get you to go to I-10.

(Garbled, overlayed informal discussion.)

Dardano: I was trying to figure out where I was at that point. So I say the only thing I can do is make a 360 here and land over the lake or put it in the water, I say. But I still going over this place and I like it, pretty good, it was looking like a big __________ beautiful, so I say okay we are going down but at that time when I was talking over here, this guy was looking all over the place. Then he said "what about that point over there." I said "where?", he said "there."

Dardano: There, it's a big hill, you know.

Kriha: There's a wall there?

Dardano: He said no, no we can't make it, I said I was trying to figure out just the speed, if I can make it all right, trying to see if some wires and all that, in my mind, I

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say what about if I try to put it there and we blew up, I crash at the end of that runway, whatever it was. And they say why don't you put it on the water. It was safe. You got to take all that responsibility in your mind. Finally, they say "let's put it there" but this time it was 2,000 feet or less than that. But it wasn't that far. So I just decided to put it there. They say "landing gear is down" and in my mind, it won't go down. Because I recall the 200 series at that moment. It won't go down, they say "yes, okay let's put it down full throttle" and all that * * * (laughter) They say be careful with the little, and I say "you got it, you got it baby." When he said be careful with the little, I put a little slide slip.

Gorney: Once you got across the lake you sideslipped it down?

Dardano: Yes, but you aren't supposed to do it. (Garbled) I just gave it a couple of sideslips (Informal, garbled conversation)

Dardano: Yes, I probably used it, I remember that when I saw it, I got it too high, so I put the speed brake, we got it. Then you say thank God we were there.

Kriha: Beautiful job.

Dardano: We were under a little pressure. The touchdown was pretty good, it wasn't (makes sound indicating rough landing).

Kriha: It looked smooth when we were out there. The grass and everything; there was gradual (tire) indentation.

Dardano: The only worry about it was the little hill, to keep the wing over; I had some concern about it (garbled, informal discussion)

Gorney: Is the consensus that we talk to Captain Soley then about the specifics of the restart?

Kriha: Captain Lopez, are you involved in it also, the restart?

Lopez: The restart, yes.

Kriha: Then we want to talk to both.

Lopez: We did it together.

Scott: As far as the hydraulics are concerned what rpm would the hydraulics start to become ineffective. This would

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help us determine just how long the engines, I mean at what point the engines, did he realize the engines had no power.

Schjoneman: We have to go back and check for sure but, for example, during our inflight starts we normally don't see a low pressure light at N-2 until an engine stops. (Garbled) It has to be very low. From what I understand is that if N-2 is windmilling significantly at all, then he had some hydraulic capability.

(Garbled)

Dardano: We have to have number one on the line, on the APU. We had number one generator on the APU.

Lopez: On the line

Schjoneman: So then I would think you would have both hydraulic systems.

Dardano: After one or both. Either one or one with the pump. I mean the handle on the airplane, it wasn't much different.

Lopez: It felt pretty much the same.

Dardano: It felt good. (Makes sound) Until we saw that place we were about 15° flap.

(Garbled)

Dardano: I didn't go by the book that specific time.

Kriha: I don't think there's anything in the books to cover what you guys had to do.

Gorney: I guess we'll get on with you and you were the first officer.

Lopez: I was the first officer during the incident after Captain Dardano told us the specific function to do. With Captain Soley we pick up the (?) and start to (?) about the engines, shut out engines procedure. And then how to restart it.

Kriha: You went through the checklist engine shutdown?

Lopez: Yes. On each engine.

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Dardano: What happened when they went "flight" immediately after the flameout?

Kriha: You went to "flight"?

Dardano: They went flight.There was a checklist.

(Garbled)

Kriha: Shutdown checklist and then restart?

Lopez: Right. He particularly gave him the order to restart the engines and to me to keep the gauges. Help him out with the restart. And that's exactly what we did.

(Garbled, overlayed questions and answer)

Lopez: Then you have starter cutoff . . . .

Kriha: How did you restart the engines?

Soley: By the book.

Kriha: Okay. Did you get a cross bleed start of a windmill start?

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Soley: It didn't . . . (garbled)

Soley: I put the A.P.V. and (garbled) went down the checklist . . . .(garbled)

Kriha: I'm trying to figure out the sequence you guys went through to start the engines because we don't have a checklist for two engine power failure.

Soley: I know.

Kriha: So you had to go beyond the checklist to make something work. I'm wondering if you used a cross-bleed start procedure and had a normal procedure of cross-bleed. You could have done it if you put the switches right, and if the engines still didn't re-light, then we know there is still something further going wrong. We are trying to figure it out. So we are looking at the checklist.

Soley: The A.P.V. We saw there was no way to do it in the flight mode. And (garbled) cross-bleed (garbled).

Kriha: A.P.V. bleed on?

Soley: Yes.

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(Garbled)

Kriha: Which engine did you start first?

Soley: Number one.

Dardano: One.

Kriha: Have starter cut out?

Soley: Yes.

Dardano: (Garbled) says you have number one.

(Garbled overlay)

Soley: Clicks. Just like that (snap). We hear the starter cut out.

Kriha: Pressure goes up. Did the blue light come on on the generator side?

Soley: Yes.

Kriha: Did you put the generator on the line?

Soley: Uh huh. I told them we had an engine (garbled) then number two.

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Soley: And "Number two is running."

? We had both engines.

Kriha: Then you went into a number two start and you went through the same procedure?

Soley: The same things. Yes.

Kriha: You got a blue light?

Soley: He checked the pressure on the APV and everything.

Kriha: How much did you have on the APV pressure, roughly, if you recall?

Soley: I saw it in a vertical position more-or-less.

(Garbled)

Kriha: What happened to the engines after that? Did your EGT go up and overtemp?

Soley: Yes. When he saw that I told him I got both engines had power (Garbled) And after that we saw the EGT

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rising, then we saw the red light. (Garbled) one by one.

Kriha: Did you do one start attempt on each engine with the crossbleed start method?

Soley: No.

Kriha: How many did you do?

Soley: (Garbled) because the red light come on, I tried to start the number one again and we found that now we don't have enough time, we run down.

Kriha: How about number two? You got a red light on that also?

Soley: Yes.

Kriha: So it sounds like one start attempt per engine. Does that sound right to you?

Dardano: That's about two or three because when we took flight and went to the shutdown checklist and then they had to start on flight mode.

Kriha: APV on?

Dardano: Then he went back to the APU. I recall that he was doing all that. He tried "flight." Never got anything so he went through shut down checklist and he tried to start on flight again. That was between (garbled).

Kriha: Two flight mode attempts?

Dardano: Yes, then (garbled) no response, he went to the APV; then we closed the packs and opened the APV and then he opened the APU. And then after that when we saw the red lights on the EGT he shut it down and that's when he said okay let's try it again and I said "hey, we were going down," you know.

Soley: You were low at the time.

Dardano: We were low.

Soley: We were at 2,000 feet.

Dardano: This guy wasn't even in the jump seat by that time. He was sitting over here. So I said hey get secure which he never got.

296

Kriha: Did you put the generators on the line? Put the generators on the line? Both generators?

Soley: Yes

Gorney: Then later you got the overtemps and shut them down. And you put the APU back on the bus.

Soley: On the left side.

Gorney: I am curious about something. Before you shut them down did you go up with the throttles.

Dardano: I went up with the throttles a couple of times. Because when I got a little bit concerned about I say hey you guys I put up the throttles all the way. (Garbled) I don't have that, you know, you probably overthrew the (garbled).

Schjoneman: Do you remember where that was relative to when the EGT light came on? Did the EGT light come on shortly after that, after you moved the throttles? Or was it . . . .

Dardano: No because I did it twice or three times and then I held it back and I let him work with it.

297

Kriha: And then it overtemped?

Dardano: Hello?

Kriha: And then it overtemped?

Soley: Yes. After I told him that they already got the both engines and he started to push the throttles back.

Dardano: I just tried to push the throttles to get some power out of there. That's when the EGT went all the way up.

G.E.: I would like to ask a question here. When you thought that you had the engines going and you reset the generator of the engines, did you get any response at all as far as changeover is concerned?

Soley Out of the electrical?

G.E.: Yes, the electrical. When you put the engine generator out did you get the change in the electrics of any sort.

Soley: I want to say yes.

296

G.E.: You did?

Soley: The number one.

G.E.: The number one but not to number two.

Lopez: We are not positive about number two but the number one.

Dardano: I remember the number one.

(Garbled)

Soley: The number one went on line.

Kriha: So after the engine came off and you should have gotten APU generator off light. I don't know if you remember that or not that's what would happen.

Schjoneman: Did you then put the no. 2 bus on the APU.

Soley: I don't remember that.

Kriha: But you have the no. 1 engine firing the whole electrical system.

299

Soley: Yes

Kriha: No. 2 never made it, never went on line.

Soley: I don't recall. At that time we weren't looking out.

Kriha: Carlos, then when you advanced the throttles that's when the EGT started rising.

Dardano: I believe so because they say on tape 5,000 and heading 330 something like that. Then I recall that I went through 5,000. I start pushing the throttles. We were at 4500, something like that. And I said "hey you guys we don't have an engine." I pushed it twice. Then I say look at that. That's when you hear (makes sound).

Kriha: What was the position of the engine bleeds during this whole thing? The engine bleed switches.

Soley: They were on.

Kriha: Engine bleed switches were on.

Soley: Yes.

Kriha: After you got the engines restarted you advanced the throttle, could you change the position of the (garbled).

Soley: No.

Kriha: Andy, does that ring a bell with you that if had back pressure in the engines.

Mihalchik: The APU could back pressure the engine but it would take the failure of two valves. Your __________ valve would have to fail and also your hydraulic pressure valve would have had to fail.

(Garbled)

Soley: Yeah he opened the fuel cross feeding valve too. Right before we tried to (garbled).

Mihalchik: When you were moving the throttles back and forth did you hear anything out of the engines? Did they sound like they were spooling up? Did you hear any bangs or anything like that? You know, nothing?

301

Dardano: No

Mihalchik: Just absolutely no response at all. At any point during the descent when you thought you were getting the engines back did you feel any difference in the flying characteristics?

Dardano: No

Mihalchik: I am not sure whether or not at that air speed and altitude it would have generated any forward thrust.

Dardano: At that time I was flying the airplane between 190 and 150 knots when all of this happened. I was gliding down and I tried to (garbled) so fast. So I got it remember (garbled) retain all this speed.

Gorney: When you got the overtemp were you still in heavy rain? When the overtemp light came on?

Dardano: No we were in the clear.

Gorney: You were in the clear.

302

Kriha: Did you have some rain but it was light rain?

Dardano: Yes. Light rain and some clouds.

Soley: You could see the ground.

Dardano: You could see the ground for about five miles ahead.

Mihalchik: Did anybody from, and I guess this is a general question, did anybody from in the passenger compartment notice any flames or anything out of the tail pipe, was there any mention of that after you guys were all milling around during the descent? Did they notice anything?

Kriha: The stewardesses or anything.

Soley: I am not sure. The flight attendants moved most of the passengers to the forward.

Mihalchik: To the forward.

Soley: I am not sure about it.

Dardano: Yeah, I don't recall hearing anything about it like somebody saying we have fire some place in the back.

Kriha: Cliff has a question.

Schjoneman: I would just like to go over the start sequence one more time to make sure I understand it exactly. You had the power loss, realized that the engines were down, you made the decision of who was going to do what and you went on to start the engines. Initially you went "flight" position on a selector "switches" and I am assuming the fuel cutoff levers were still off at that point, right?

Dardano: Yes.

Schjoneman: So at that point you were in the configuration where you had fuel and you would have had ignition and you didn't get any response out of the engine.

Soley: Yes

Gorney: Do you remember indications at all on the gauges as to what part engine ____________________?

Schjoneman: So then I guess you opened the cross feed valve and started the APU?

Soley: No I put the AVV (garbled) on the fuel crossing valve on.

Schjoneman: Okay. Then did you start into the shutdown check list?

Soley: Yes

Schjoneman: Then the fuel cutoff levers went down. At some point there? Do you remember if the APU generator was up or not on line before that?

Soley: Yes, I put the left bus on right here.

Schjoneman: You got it up after you cut fuel? Do you remember? And I realize that this is a level of detail. . . .

Soley: (Garbled) hard to say exactly. (Garbled) we got the APU; cross feed valve and "flight". (Garbled overspeaking)

Schjoneman: So at some point after that you started into the shutdown check list, moved the fuel cut levers off and then you started into the . . . .

Soley: Restart procedure (garbled)

Schjoneman: And then you made an attempt on number one.

Soley: Yes.

Schjoneman: But prior to that point you put both packs off.

Soley: Yes

Schjoneman: Both packs off, engine bleed on, isolation valve on auto.

Soley: I didn't touch that auto.

Schjoneman: Yeah, I'm just trying to understand exactly what . . . .

Soley: Both bleeds, I mean engine bleeds were on.

Schjoneman: That's fine. Then you put the APU on.

Soley: Yes.

Schjoneman: Okay at that point you got that pressure and now

306

you started on start sequence, so I guess, what number one.

Soley: Number one first.

Schjoneman: Did you try to do it with it in "flight" first?

Soley: Like I said, the APU was starting, I put the start switches in "flight."

Schjoneman: Okay that was your attempt in "flight." Okay after you got the APU running then you went directly to a starter assist, so you went number one to the ground?

Soley: Yes

Schjoneman: And then some point you (garbled) the fuel line, do you remember what add to you brought the fuel lever up at?

Soley: What is this?

Schjoneman: 26. Okay so you brought the fuel lever up. Did you get a light? Did the EGT start up?

307

Soley: (Garbled) the pressure came back and that's when I told him we got the engine.

Dardano: Number one engine.

Soley: Number one engine.

Dardano: And he went to the generator.

Schjoneman: Do you remember after you put the fuel lever on, do you remember engine parameters at any point during the (garbled) you just felt it accelerating and so (garbled). So it went on up and cut out, you got, I'm not sure of the generator light works, does the generator light come on when its ready to come on?

Kriha: Yes

Schjoneman: So you put the generator on. Just roughly what is your estimate of how long after the flameout this point was? In other words, how long did it take from when the engine is flamed out or when you lost electrical power, until you got number one out and ready to put the generator on line?

308

Soley: Two or three minutes. I remember when (garbled), I guess five minutes, 4000 to the ground (garbled).

Schjoneman: So you now you got number one going. Did anybody make an attempt to push number one up in thrust or did you go straight to the number two engine?

Dardano: He went straight to the number two engine.

Soley: I started number one engine, go straight to the number two.

Schjoneman: The thrust lever was just sitting idle state.

Dardano: When I say okay let's maintain 5,000 and 2 2 0 heading, or 3 3 0 heading or whatever it was, then I start by that time he said "okay you have number two," I say "okay."

Schjoneman: Okay getting back to where we were. You got number one going with, did you make any change to the relief valve configuration?

Soley: No

309

Schjoneman: Okay you went directly to number two and just went to the ground and uh . . . .

Soley: Instead of going out from (garbled), I raised the start lever.

Schjoneman: Do you recall, you say looking at the duct pressure, you don't recall the value of just saying like they were vertical?

Dardano: Yes over (garbled)

Schjoneman: Both. Yes, so number two came up through cut off. You don't recall the generator (garbled). After the number one start. Okay you already said . . . .

Dardano: What happened there is that when he said you look at N-2, I was putting the cover back on so he didn't have time to put the generator on to the line. Because I say "hey I don't feel anything." We don't have the power. Then immediately it was we saw the EGT going up.

Schjoneman: Both engines?

310

Dardano: Both engines at the same time. When I turned around and saw I was looking outside, I saw water.

Mihalchik: And you didn't notice what the other engines, other than EGT, was N-2 spooling up or was it hanging (garbled).

Dardano: Called attention to the light.

Mihalchik: Just the light, sure.

Schjoneman: So the left engine EGT went up first.

Soley: Yes.

Schjoneman: Do you recall if that generator ever tripped off line before you shut it down?

Soley: No

Schjoneman: Do you recall any interrupt at all in power? See I am kind of wondering if you had the APU plugged into bus 2 after the start. If the APU wasn't on, you just had the number one generator on line I would expect that when you shut the engines down that you would have gotten power interrupts.

311

Dardano: I believe that it goes back to the APU and the bus.

Cliff: I am wondering if you got a power interrupt at some point.

Dardano: No that I recall, to be honest.

Kriha: Then when you shut down both engines did you put the APU back on the bus?

Soley: I think so but I don't recall. Sorry . . . .

Kriha: You must have because the ATC was still reading your altitude at 700 feet.

Cliff: So you either already had it on number two and it just stayed where you put it.

Soley: You cannot have both busses on.

Schjoneman: You can't have the APU on both busses in the air.

Mihalchik: But as I understand it you had number one started when you put the number one generator on line. At

312

that point you could put the number two bus on the APU.

Dardano: We never did. You mean try to put one generator on top of the other one on the APU? We never did that. So by that time we had both busses on the engines and one on the APU? We never got that. No. I believe number 2 bus never came on the line after the flameout.

Mihalchik: So then when you shut the engines down, you had put one of the busses back on the APU.

Dardano: Somewhere between then it comes out of mind that we don't have power and we just blink back on the APU. He was doing it all of it. He got it somewhere between them because it wasn't that way we lost our power in between.

Mihalchik: I realize I am asking questions that are way more detailed than anybody can remember.

Dardano: Right

Mihalchik: I want to understand as well as I can.

313

Dardano: We were trying to go through this every time we because I recall when we land and every thing was okay after the operation and all this. Why can the engine not start? We were concerned about it you know.

Mihalchik: When you were starting both number one and number two engines, when you moved the fuel lever from cut off to idle, did you sense that the engine started immediately? That it lit off?

Soley: Yes

Andy: So it was like a normal start and that happened on both engines.

Soley: Yes

Kriha: During the windmill restart attempts, you say your APU went on the bus valve, you opened that, then you went into flight. Did you go to cutoff and then back to idle?

Soley: No because I was waiting for the manual to start in flight position.

Kriha: So you kept them up in the idle?

314

Soley: Yes. We didn't have any answer from the (garbled).

Kriha: No response. Then you went to the shutdown checklist. Then you went to the APU cross start attempt.

Soley: Yes.

Kriha: Do you recall during the flight start windmill attempt, do you recall any engine parameters? AGT.

Soley: No

Mihalchik: Were all of the gauges powered up and you just don't remember the numbers?

Soley: Yes. There was no discussion. I don't know what position. I never saw an answer in the pages. (Garbled).

Kriha: Do you recall how long you waited at the flight for the . . . .

Soley: (Unintelligible)

Cliff: Several minutes for the engines to relight on windmill?

315

Soley: (Unintelligible)

Mihalchik: So basically when you were in the flight position trying to do a windmilling start the APU bus was on.

Soley: (Unintelligible)

Mihalchik: It was starting at this time. So you had the APU starting while you were trying to do the (garbled).

Soley: (Unintelligible)

Mihalchik: Do you recall what kind of weather conditions you were in when you were trying to do the windmilling starts? I mean was it raining, was it very turbulent? Was there some hail?

Soley: (Garbled)

Andy: But you don't recall any noise or anything like that? Nothing that you can remember.

316

Dardano: I knew I was getting back the speed. From the moment that I knew I was flying down I started trying to be higher.

Mihalchik: You didn't notice any kind of change in the noise around the cockpit during this whole sequence as to whether you were in the rain or out of it or anything like that.

Dardano: No

Mihalchik: Would you say, I still want to clarify it in my mind, would you say that tried at least one windmill start with the APU on the line, on the bus?

Soley: The start switches were already in "flight" position.

Mihalchik: Okay when you put the APU on line. Okay, and the cutoff levers were still on the idle position for the start up?

Kriha: Basically, Andy, I think they didn't go through the engine shutdown check list prior to windmill attempt, they just went to "flight" which constituted a windmill restart.

317

Dardano: That was the first time. Right after we lost those.

Kriha: And then when there was no response to that then they went to the engine fair check list, right.

Dardano: Yes

Kriha: And then the cross bleed start.

Dardano: (Garbled)

Mihalchik: So when you went to go do your cross bleed start using the APU air you would turn the ignition selector switch to both or was it, what position?

Soley: Right side.

Mihalchik: It was on the right side. So you had it on the right side. Was it in the right side at the initiation of the descent?

Soley: Yes

Dardano: I start on the right side in Belize.

318

Mihalchik: And you just left it on the right side in Belize.

Soley: From Belize to (garbled) on one side all day and (garbled) when you finish your flight put it in the up position for the next trip.

Mihalchik: Okay, great.

Kriha: No more questions.

Gorney: You, Andy?

Mihalchik: Let me check my list. No, I think we have covered everything as far as I can see.

Mihalchik: Do you recall at all what the total air temperature was, TAT was, after the flameout event like when we were trying to do the restarts or anything? Did anybody happen to catch what total air temperature was?

Soley: I would say it was below 10° because we had to put on anti-icing.

Kriha: Would the engine anti-icing remain on during the restarts?

319

Mihalchik: Can it remain on?

Kriha: It did, right? The engine anti-ice switches were on during the restart attempt?

(Garbled conversation between several persons.)

Mihalchik: Using APU air bleed switches is there sufficient pressure to get a normal spool level restart?

Schjoneman: From the way the system is configured you got the APU pressure rising in the manifold, the engine side and so they are going to check blows in this situation so you are not actually going to have flow through unless valve fails.

Mihalchik: No back blow through there unless the valve did fail.

? __________ That's part of the reason __________ to run checks ______________

Mihalchik: And it all proved out okay. Wasn't there one valve that was a little iffy?

320

? No____________ the checks that were done out there showed it within ______________. One of them when he did the pressure check showed _________ PSI __________________

Gorney: At the 300 differences, did they cover that? At 300 differences they did cover restart.

Soley: (Garbled)

Gorney: What was that again?

Soley: (Garbled). When we went to the difference course, they told us that we could use the APU for engine restart air start.

Kriha: For cross bleed start in flight with the APU? One jump ahead of Boeing. Was that an American who taught you that?

Soley: Yes

Mihalchik: As I understand it, basically you were IMC the whole descent through the restart procedure and everything, and you had basically both engines running before you broke out of the clouds.

321

Dardano: Yes, exactly but at the same time I believe so. They relaxed a little bit because I was looking where we were going at the time you said.

Soley: We got the number one back.

Dardano: But this time we were very aware and all that. I recall very well that the turning to the heading that they give us I was going to go through the thunderstorms again at least to the rain part of the thunderstorm. So that I recall that meanwhile I was trying to keep the airplane in visual conditions, not just, we had the engines (garbled). I kept on looking that's why I never turned to that heading that they said. I kept on going to the place that I chose. Because of the power, I never got the power.

Mihalchik: Thank God you did.

Dardano: Yeah, because I lose the time trying to go to all these headings like all the time. On my mind, this part of the world was okay. So I was put on the earth to get over there I guess and he was saying okay vector to this airport. I never got to that heading. I was just trying to get condition first. I was not getting too

320

good an approach on a gliding airplane in IFR conditions and to nowhere. So I was first trying to get the airplane out of the weather, like we did, and then I was saying, okay, how is the weather in that system, it's raining, no way. So I decided its better to stay here, and see where we land than going into the weather trying to make an airport, crash before it gets to the runway or whatever. That's why you heard when I say okay the most I can do is make a 360 here and land. I never did you know, I just say land just keep on going to the place that I chose. That's it basically. When you got a loss of power on a single engine.

(Tape changed)

* * * * *

Mihalchik: Let the ice build up and we do a burst at take off or a high power setting.

Dardano: (Garbled).

323

Mihalchik: This is all on the ground on a test sand. Not even in the air.

Dardano: (Garbled).

Lopez: You can put the engines in position like this going up or going down.

Mihalchik: We don't simulate any flight attitudes, no acceleration. In fact I don't know of any test sands that are capable of doing it in the first place but we don't do that yet.

? How about the effect of air flow to resemble strong vertical descent.

Mihalchik: No and there was also some testing done on our flying an airplane that we put the engine on during its development and we go fly it behind a tanker and let this tanker spray water at it at altitude while its operating and those tests did, and that's mainly to look at the cowling and anti-icing characteristics with it on and off and also to look at what happens to the engine in flight as far as ice build up and how it handles and as far as I know there were no problems encountered. Of course it is very limited in the amount of water that it can put out and the amount of icing that it creates on the engine. But at least it is somewhat simulated.

(Colloquy)

Mihalchik: You were speaking of the vertical bump just before the engines flamedout, did you notice anything unusual in the sound characteristics coming from the engine just before they quit or during the bump or anything like that. Usually it is so quiet during an idle descent you don't really hear anything.

? At flight idle they wouldn't have noticed a very big change.

(Garbled response)

Gorney: Are we down to the end of the line here?

? I don't have any more questions or comments.

Gorney: Cliff?

Schjoneman: No

Gorney: Andy?

Mihalchik: Nothing

Gorney: TACA?

(End of Tape No. 3 of 3)

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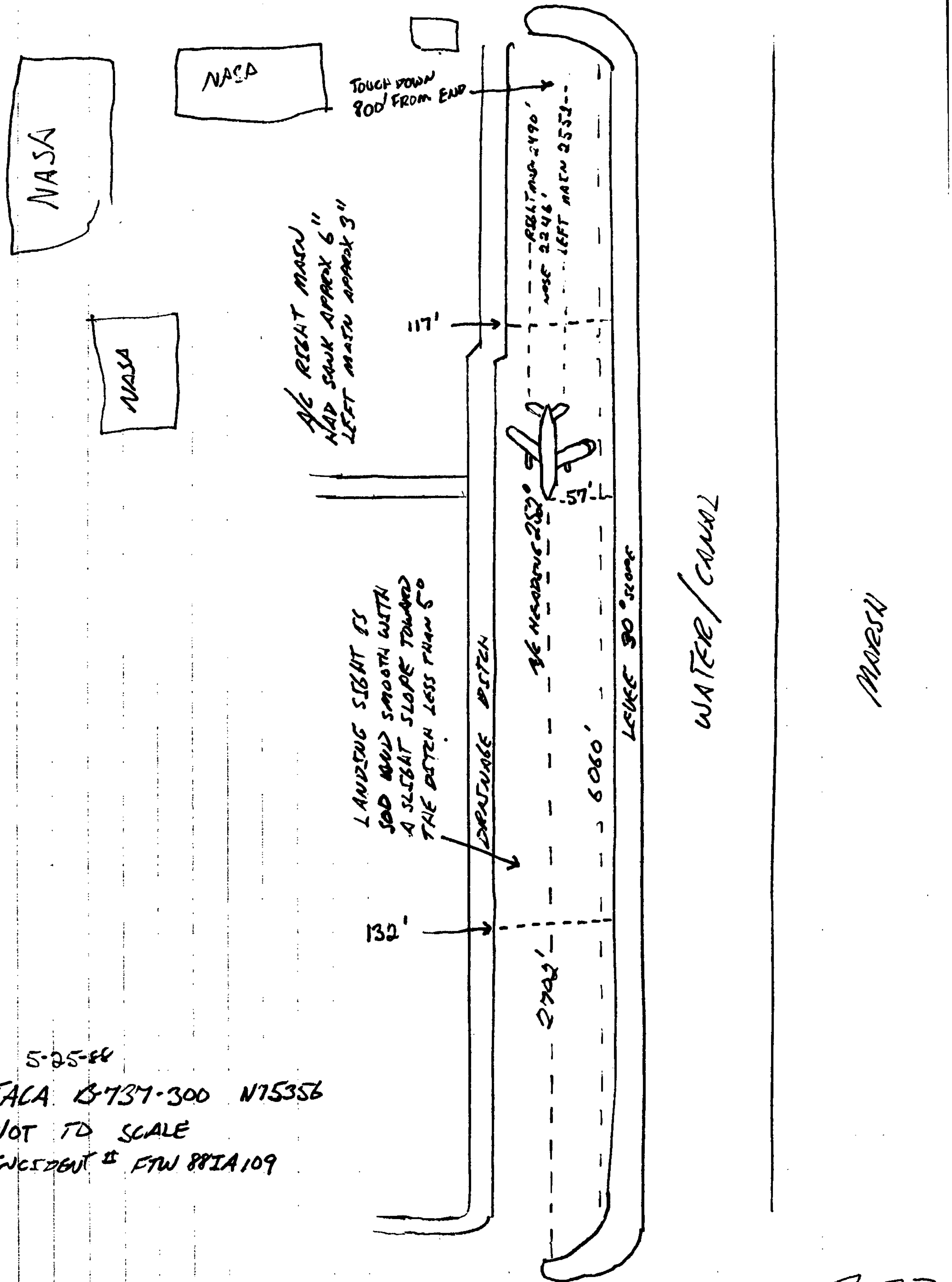
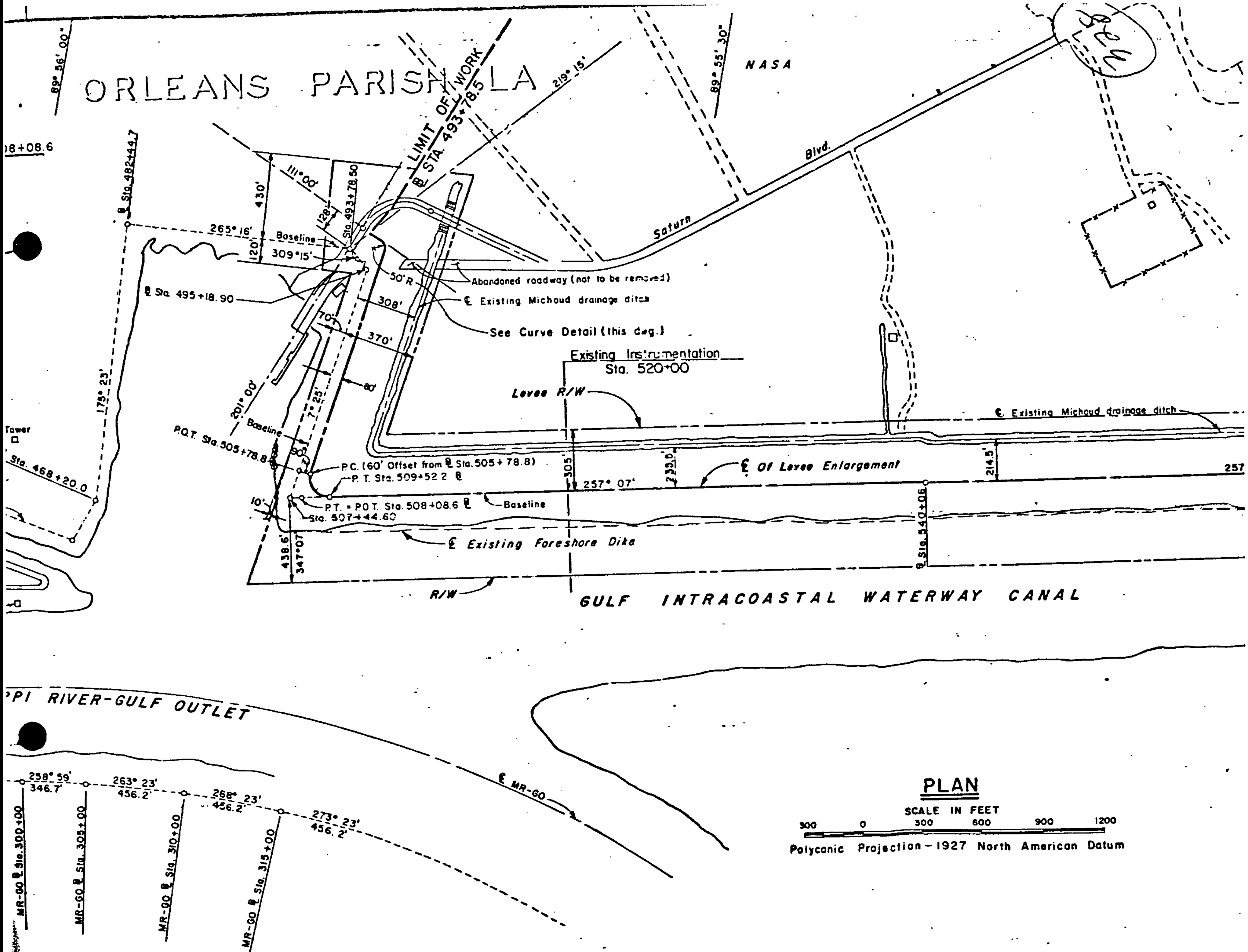
Landing Area Diagram

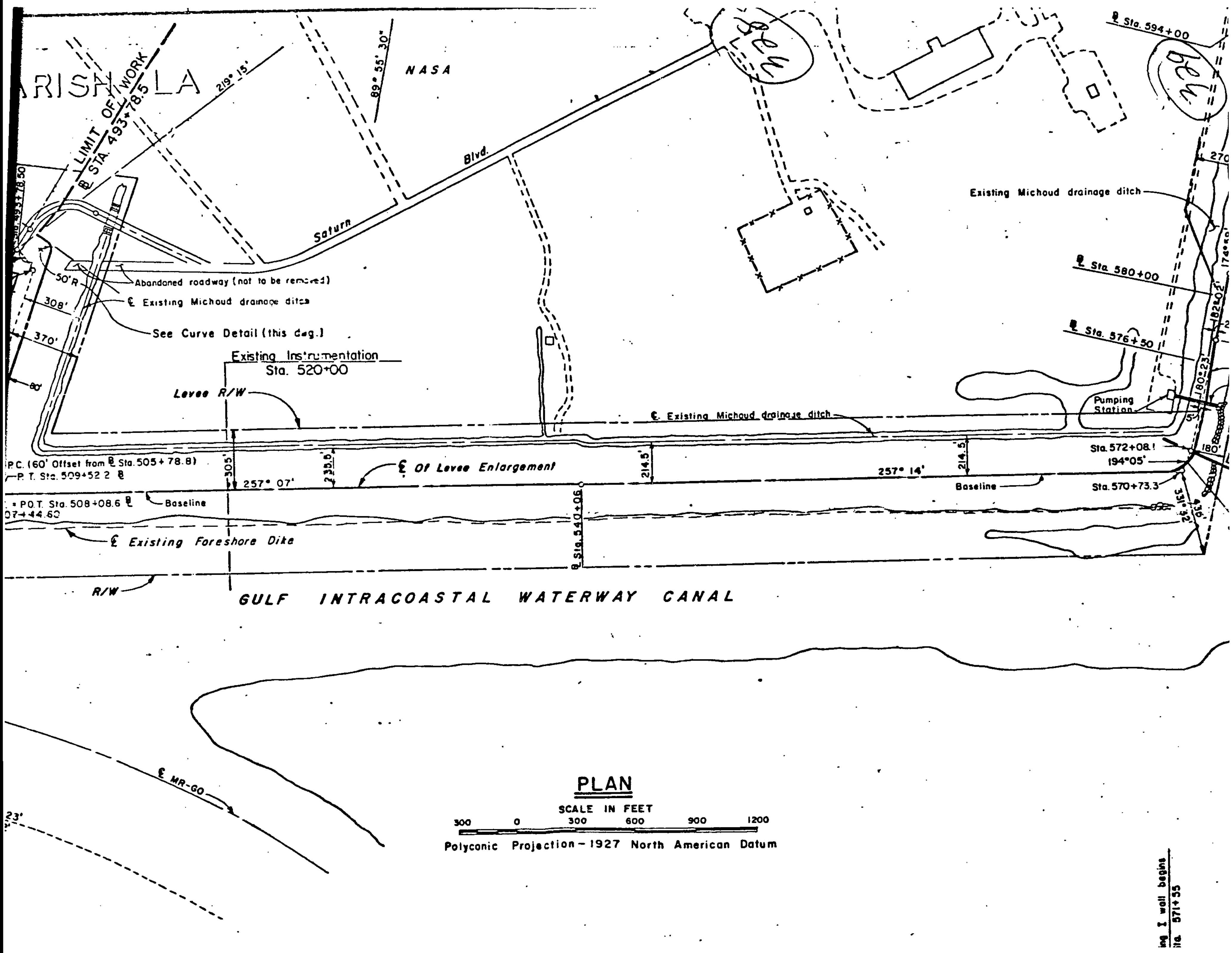


5-25-88
TACA B-737-300 N75356
NOT TO SCALE
INCIDENT # FTW 88IA109

Levee Diagram

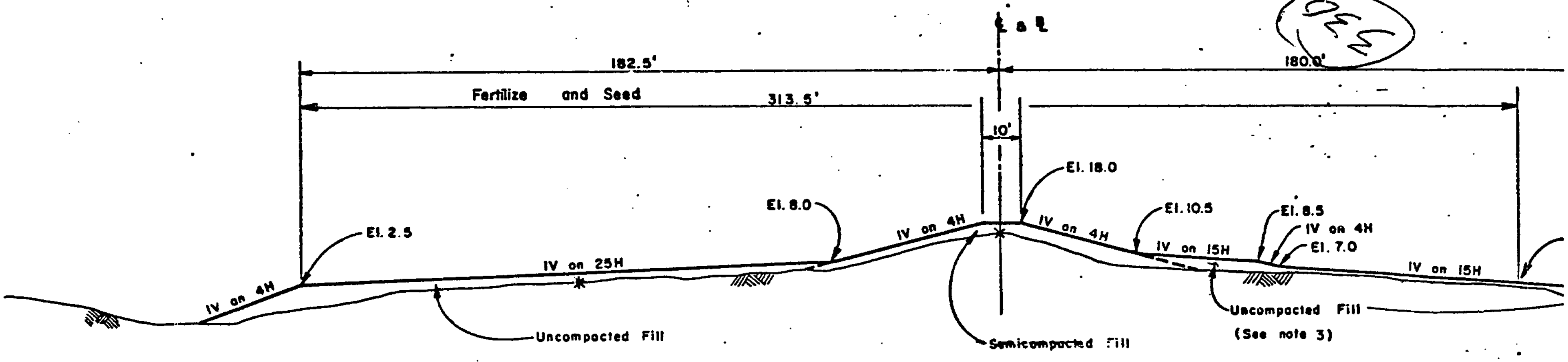


ORLEANS PARISH LA
NASA
89° 56' 00"
89° 55' 30"
219° 15'
LIMIT OF WORK
℄ STA. 493+78.5
Saturn Blvd.
)8+08.6
℄ Sta. 482+44.7
430'
111° 00'
128'
Sta. 493+78.50
265° 16'
Baseline
120'
309° 15'
50' R
Abandoned roadway (not to be removed)
℄ Existing Michoud drainage ditch
℄ Sta. 495+18.90
308'
70'
370'
See Curve Detail (this dwg.)
Existing Instrumentation
Sta. 520+00
Levee R/W
℄ Existing Michoud drainage ditch
80'
7° 25'
201° 00'
175° 23'
Tower
Sta. 468+20.0
Baseline
P.O.T. Sta. 505+78.8
90°
P.C. (60' Offset from ℄ Sta. 505+78.8)
P. T. Sta. 509+52.2 ℄
305'
233.6'
257° 07'
℄ Of Levee Enlargement
214.5'
257
10'
P.T. = P.O.T. Sta. 508+08.6 ℄
Sta. 507+44.60
Baseline
℄ Sta. 540+06
438.6'
347° 07'
℄ Existing Foreshore Dike
R/W
GULF INTRACOASTAL WATERWAY CANAL
'PI RIVER-GULF OUTLET
℄ MR-GO
258° 59'
346.7'
263° 23'
456.2'
268° 23'
456.2'
273° 23'
456.2'
MR-GO ℄ Sta. 300+00
MR-GO ℄ Sta. 305+00
MR-GO ℄ Sta. 310+00
MR-GO ℄ Sta. 315+00
PLAN
SCALE IN FEET
300 0 300 600 900 1200
Polyconic Projection - 1927 North American Datum



ARISH LA
LIMIT OF WORK
℄ STA. 493+78.5
219° 15'
89° 55' 30"
NASA
Saturn Blvd.
50'R
Abandoned roadway (not to be removed)
℄ Existing Michoud drainage ditch
308'
370'
See Curve Detail (this dwg.)
80'
Existing Instrumentation
Sta. 520+00
Levee R/W
℄ Existing Michoud drainage ditch
P.C. (60' Offset from ℄ Sta. 505+78.8)
P. T. Sta. 509+52.2 ℄
305'
235.5'
257° 07'
℄ Of Levee Enlargement
214.5'
257° 14'
214.5'
P.O.T. Sta. 508+08.6 ℄
Baseline
℄ Existing Foreshore Dike
℄ Sta. 540+06
R/W
GULF INTRACOASTAL WATERWAY CANAL
℄ Sta. 594+00
Existing Michoud drainage ditch
270'
℄ Sta. 580+00
182.02'
℄ Sta. 576+50
180.23'
Pumping Station
Sta. 572+08.1
194°05'
180'
Baseline
Sta. 570+73.3
331° 32'
436'
℄ MR-GO
23'
PLAN
SCALE IN FEET
300 0 300 600 900 1200
Polyconic Projection - 1927 North American Datum
Sta. 571+55

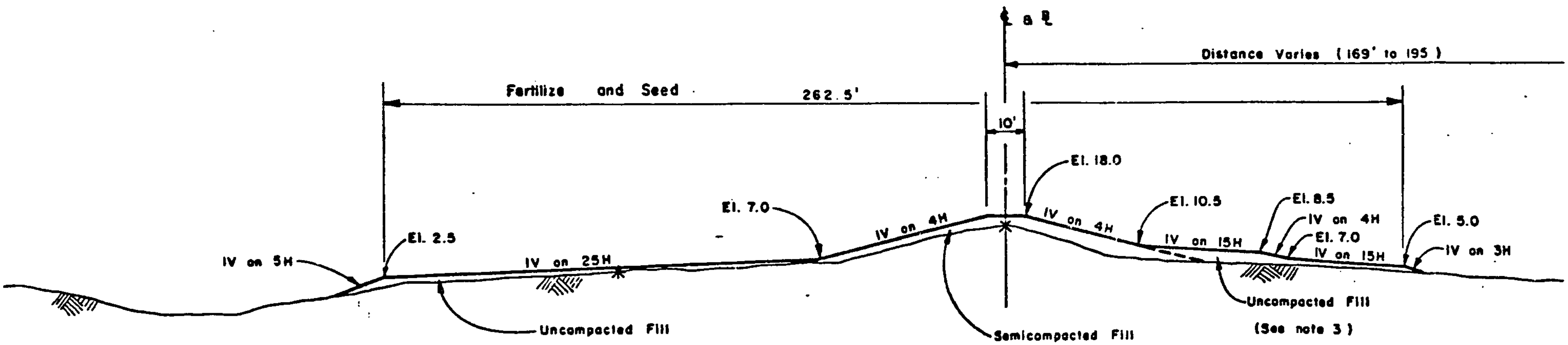
330



TYPICAL SECTION

NOT TO SCALE

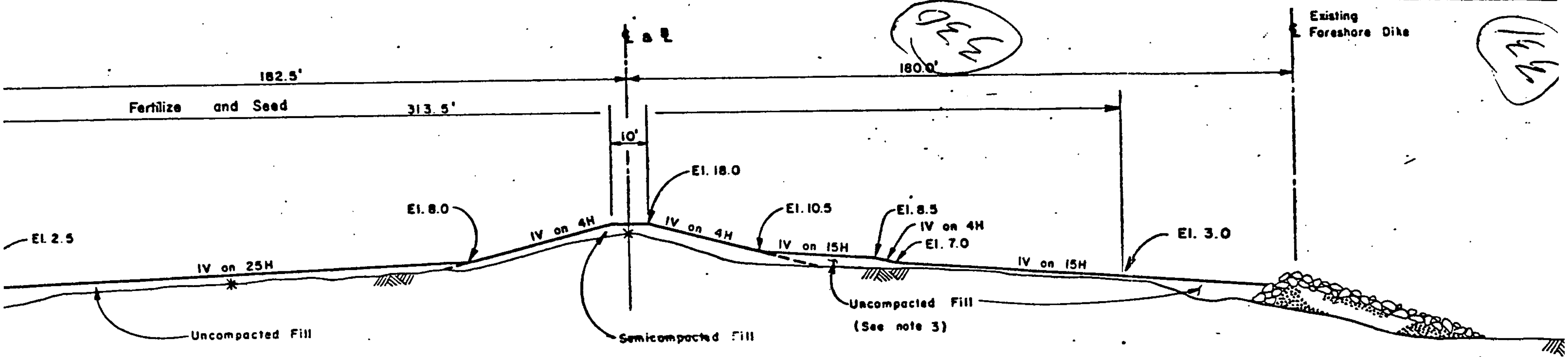
℄ STA. 507+79 ± TO ℄ STA. 540+00 ±



TYPICAL SECTION

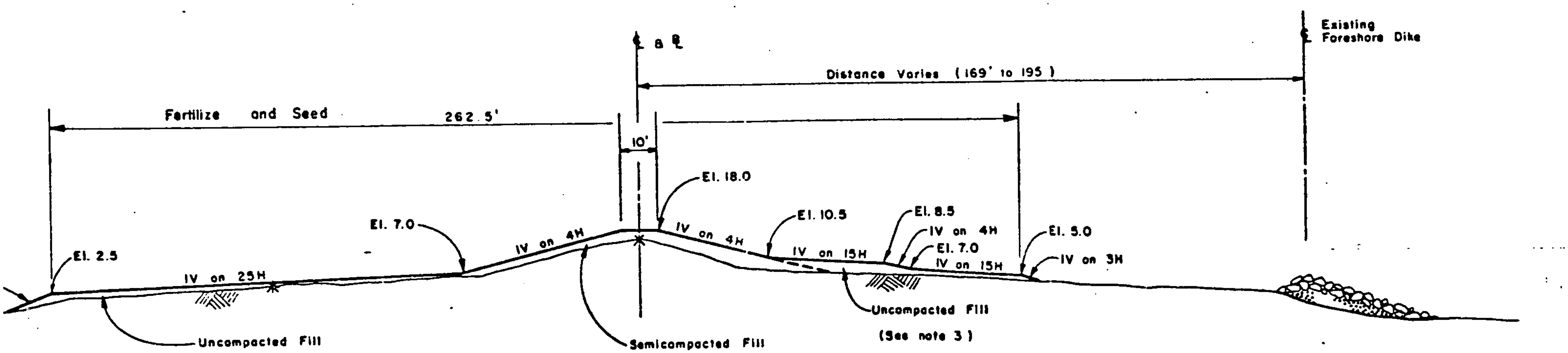
NOT TO SCALE

℄ STA. 540+50 ± TO ℄ STA. 571+60



TYPICAL SECTION
NOT TO SCALE

℞ STA. 507+79± TO ℞ STA. 540+00 ±



TYPICAL SECTION
NOT TO SCALE

℞ STA. 540+50± TO ℞ STA. 571+60

CFMI/Boeing CVR Frequency Analysis

FREQUENCY ANALYSIS OF COCKPIT VOICE RECORDER TAPES

TO DETERMINE ENGINE OPERATING SPEEDS

FROM THE TACA AND CONTINENTAL POWER LOSS EVENTS

JOINT CFMI/BOEING ANALYSIS

MARCH, 1989

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1.0 Introduction

This report presents the results of work carried out by CFMI and Boeing in regard to the estimation of engine operating speeds from a frequency analysis of cockpit voice recorder (CVR) tapes covering the Continental Airline (CAL) Flight 522 and TACA Flight 110 power loss incidents.

While the CVR tapes were the prime data source for this study the representation of the frequency content of the tapes was presented in several forms in order to ensure that maximum information was extracted from the reduced data. In addition, transcripts of the actual events produced by the NTSB as well as Flight Data Recorder (FDR) data were used to reinforce the observed frequency components attributed to engine tones.

It is felt that the reproduction of the frequency spectrum (waterfall) data used in this study is not practical and would not convey any additional information other than that which is already contained in the attached figures.

2.0 Continental Flight 522 Power Loss

2.1 Background

On July 26, 1988, a Continental Airlines 737-300 powered by CFM56-3 engines experienced a power loss in engine No. 1 while encountering heavy precipitation in a thunderstorm.

Since the Flight Data Recorder (FDR) did not include engine rotor speed data, a frequency analysis of the Cockpit Voice Recorder was conducted in an attempt to determine engine speeds during the event.

2.2 Engine Information

No. 1 engine (E1) ESN 721-641 (power loss).

No. 2 engine (E2) ESN 721-238.

100 percent N1 = 5175 RPM, 100 percent N2 = 14460 RPM.

Flight Idle (F/I); N1 = 32 percent, N2 = 71 percent.

2.3 Source Data

CVR transcripts, provided by NTSB.

Color waterfall plots, provided by Boeing.

Discrete frequency waterfall plots, digitized by CFMI from NTSB tape.

Time history data plots, digitized by CFMI from NTSB tape.

Flight condition data, from the FDR provided by NTSB.

Flight test fan/core speed match data, from Boeing flight test.

NTSB waterfall plots.

2.4 CVR Sensitivity

Frequency Range (Hz)	Amplitude Sensitivity	Possible Engine Tones(1)
0 - 50	None	--
50 - 100	Fair	1/f, 2/f, 3/f
100 - 250	Fair	1/c, 3/f
Fan BPF	Fair on NTSB data	38/f

Notes:

(1) 1/f (one per fan) or 1/c (one per core) means that the signal frequency is equal to fan or core rotor speed (fundamental frequency). 2/f (two per fan) means that the signal frequency is two times the fan rotor speed...

2.5 Analysis

Figures 1 to 7 are timeline plots of estimated/derived engine tones from approximately 6 minutes before the power loss to approximately 20 minutes after the event. Comments from the CVR voice transcripts are noted at the base of the figures. On the time scale used for the plots, the loss of the No. 1 generator occurred at 09:46, causing a power interruption that was discernible in the waterfall data. This indicated that the No. 1 engine was decelerating through a core speed of approximately 56 percent N2.

The observations and assumptions made are stated on the relevant plots but the main points are summarized here.

Figure 1 presents, in a condensed form, the engine fan speeds estimated for the entire event.

Figure 2 covers the period of time before the heavy precipitation and it is assumed that the engines were matched in speed. As is the case for the remainder of the plots where core speeds are presented (except for the period 11:00 to 17:58), the core speeds were estimated by using fan/core speed relationships derived from Boeing flight test data. Up to the time of 09:02 fan fundamental and 3/f tones were clearly visible in the reduced data.

In Figure 3 fan fundamental tones were observed on leaving the heavy precipitation and were attributed to engine No. 2. Tones of approximately 150 Hz were observed during the period of time when engine No. 1 was undergoing a windmill restart. For the period 11:00 to 17:58 (Figures 3 and 4) a trace believed to represent core speed for the No. 1 engine was visible in the data but a corresponding trace of fan speed was not. Fan speed was therefore calculated using the Boeing flight test N1/N2 relationship discussed earlier. The data indicates that as the aircraft exited the heavy rainfall core speed was below flight idle and above normal windmilling speed. While this is inconsistent with what would be expected, there are a number of factors

factors that may have had an influence, including moisture content of the air, engine damage and status of the engine anti-icing system. Due to these uncertainties, questionable signals observed during this period are provided in Figure 8 for future reference.

After 19:15 no tones were observed which could be associated with engine No. 2.

After 17:58 fan speed for the No. 1 engine was calculated from discrete tones observed in the reduced data attributed to engine No. 1.

2.6 Findings

Fan fundamental tones could be identified for portions of the CVR tape but not during the period of time covering the heavy precipitation. The noise associated with the precipitation striking the airplane obscured the relatively low amplitude rotor speed tones for a time period of approximately 90 seconds beginning approximately 30 seconds before the power loss. Engine thrust settings at the time of the power loss could not be determined through the CVR frequency analysis.

Frequency response characteristics of the CVR severely attenuated fan tones in the engine low thrust operating range.

During the holding condition prior to entering the heavy precipitation, both engines appear to have been operating at approximately 60 to 70 percent N1 (20,000 ft, 235 KIAS) which is consistent with thrust requirements for this flight condition at the estimated gross weight of 88,000 lbs.

3.0 TACA Flight 110 Power Loss

3.1 Background

On May 24, 1988, a TACA 737-300 powered by CFM56-3 engines experienced a dual engine power loss while encountering heavy rain and hail in a thunderstorm.

Since the Flight Data Recorder (FDR) did not include engine rotor speed data, a frequency analysis of the Cockpit Voice Recorder (CVR) was conducted in an attempt to determine engine rotor speed information. The portion of the CVR recording that was available from TACA flight 110 did not cover the time at which the engine power losses occurred, but did cover several minutes of flight prior to touchdown when engine restarts were being attempted.

3.2 Engine Information

No. 1 engine (E1) ESN 721-971.

No. 2 engine (E2) ESN 721-973.

100 percent N1 = 5175 RPM, 100 percent N2 = 14460 RPM.

Flight Idle (F/I); N1 = 30 percent, N2 = 70 percent.

3.3 Source Data

CVR transcripts, provided by NTSB.

Color waterfall plots, provided by Boeing.

Discrete frequency waterfall plots, digitized by CFMI from NTSB tape.

Time history data plots, digitized by CFMI from NTSB tape.

NTSB waterfall plots.

3.4 Analysis

Figure 9 is a plot of rotor speed derived from a frequency analysis of the available CVR data.

From a comparison of the various waterfall plots and the transcript, there appears to have been a time shift in the time reference of approximately 8 seconds among the data sources. Since no absolute time reference could be fixed from the reduced data, comments from the CVR transcript on Figure 9 may really have occurred up to 8 seconds earlier than indicated on the figure.

Based on flight crew comments and background noise identified as starter cutout (12:51:19 CDT) tones observed in the data were attributed to N2 fundamental frequency.

Determination of the source engine for the tones was based on the flight crew comments from the CVR transcript. It was not possible to attribute the engine tone that appeared at approximately 4:00 minutes to a specific engine.

3.5 Findings

No data was available which allowed engine rotor speeds to be estimated at the time of the initial power loss.

Estimates of the engine speed during restart attempts have been based on the observed tones in the data. There appear to have been four instances of one engine or the other rolling back without achieving a stabilized idle condition.

FIGURE 1

CONTINENTAL FL 522 POWER LOSS

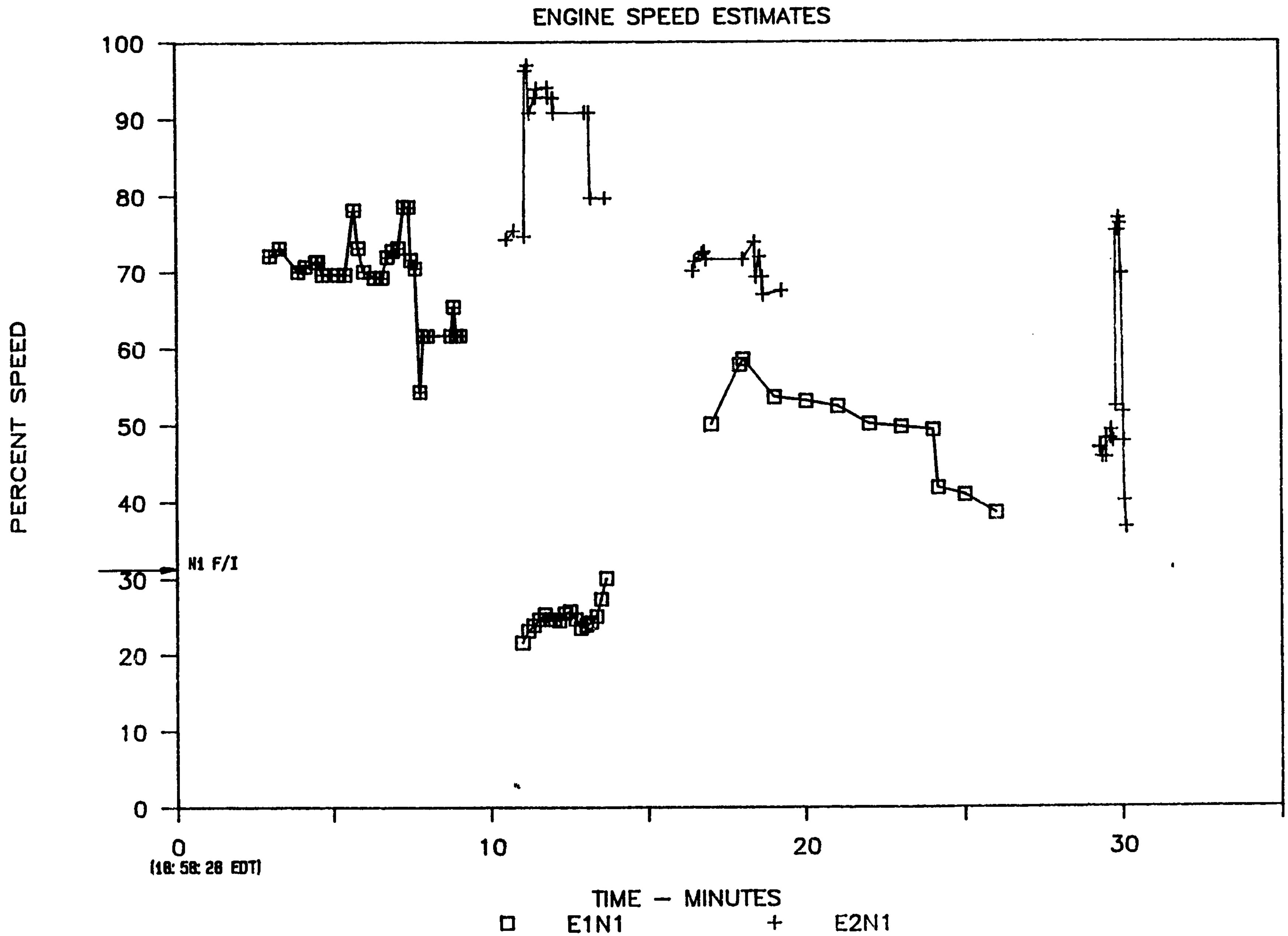

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FIGURE 2

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

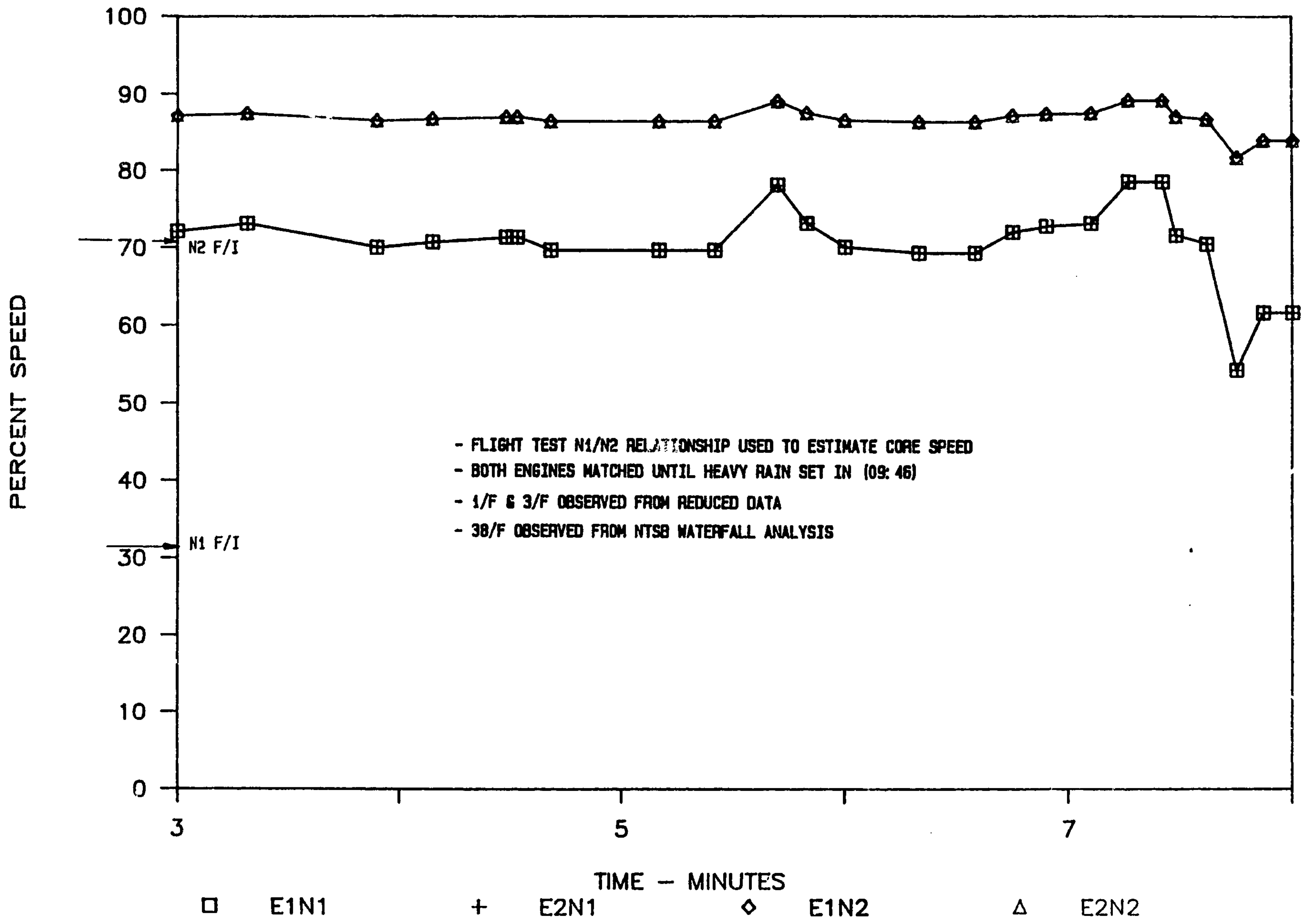

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FIGURE 3

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

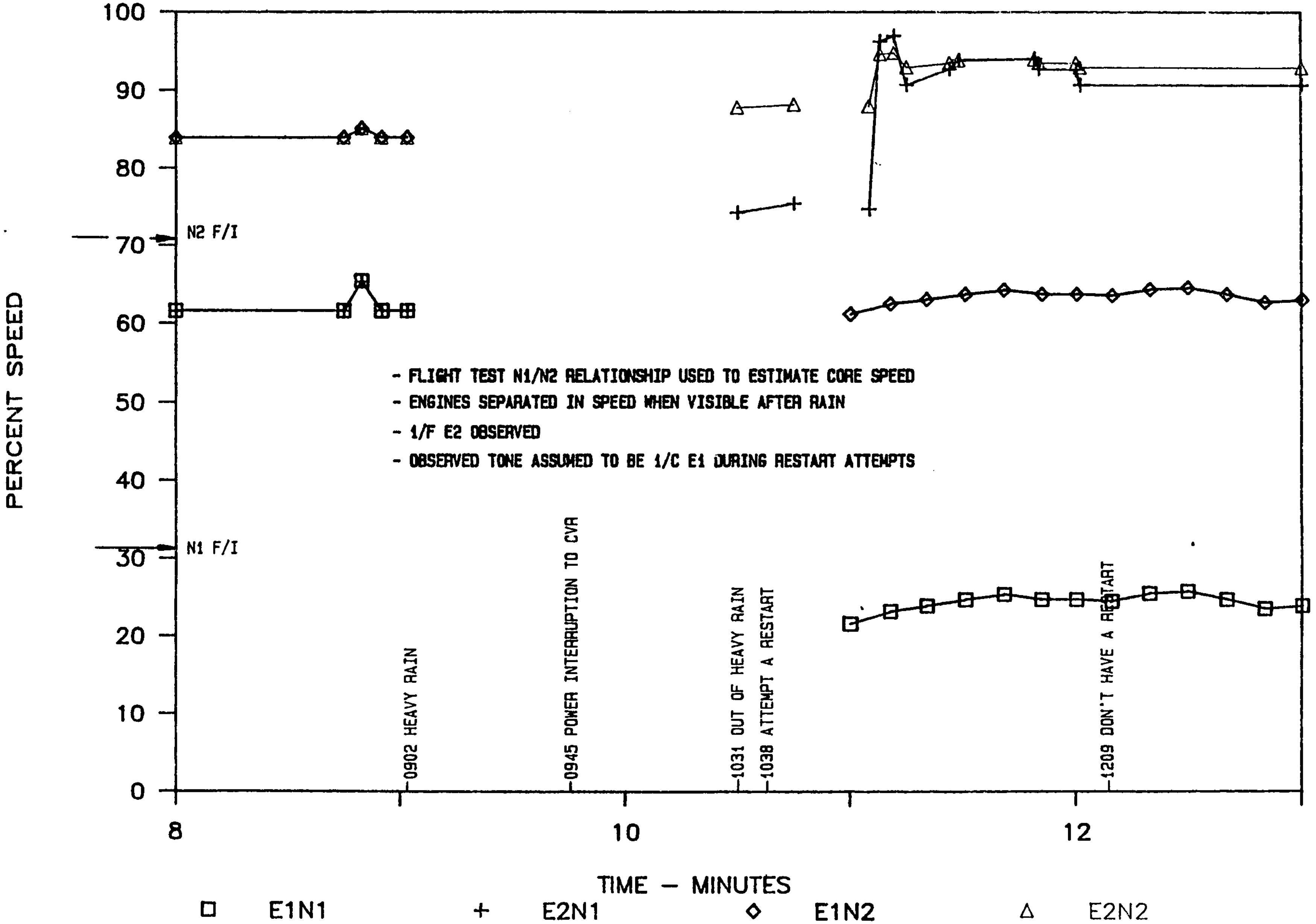

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FIGURE 4

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

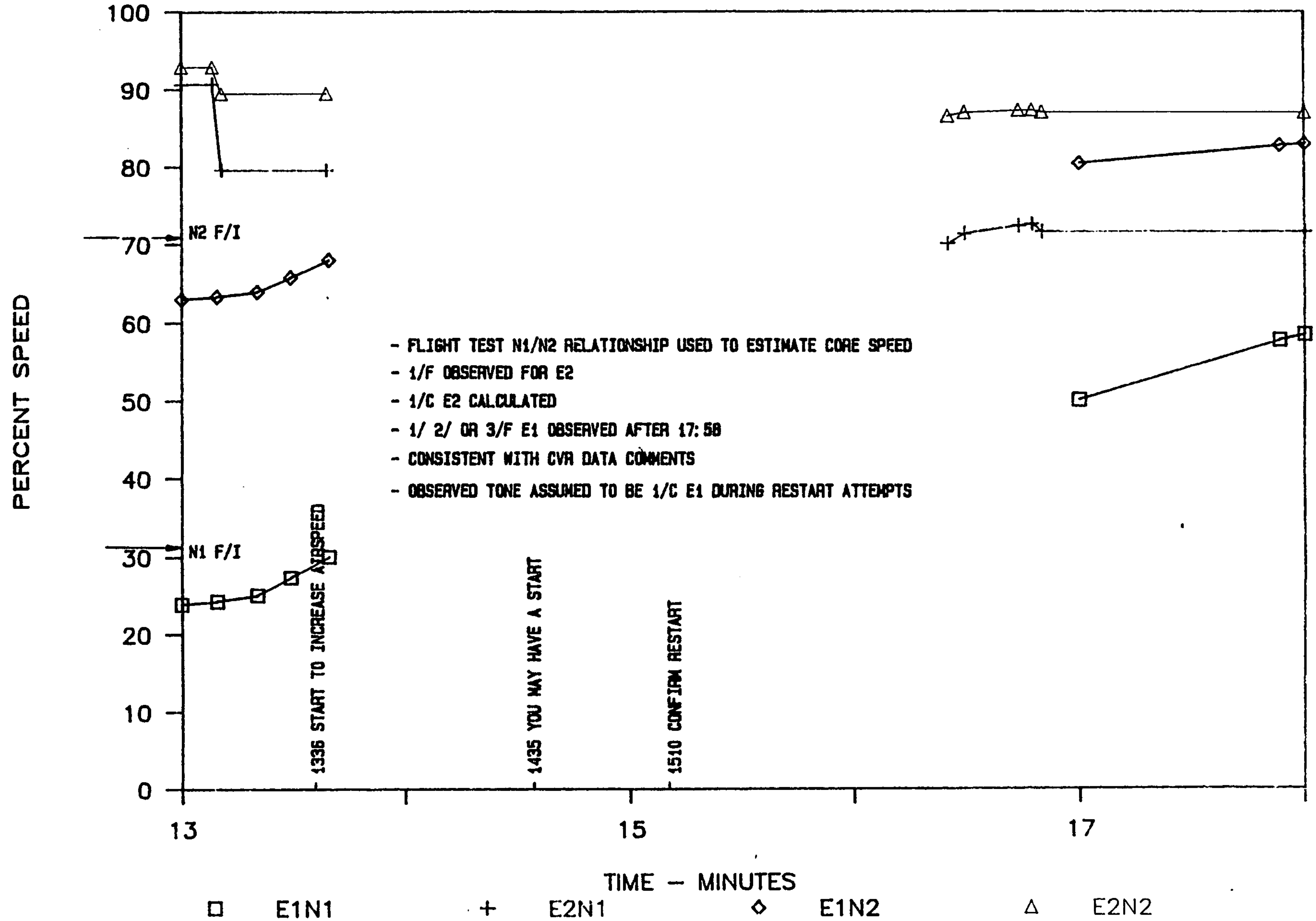

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FIGURE 5

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

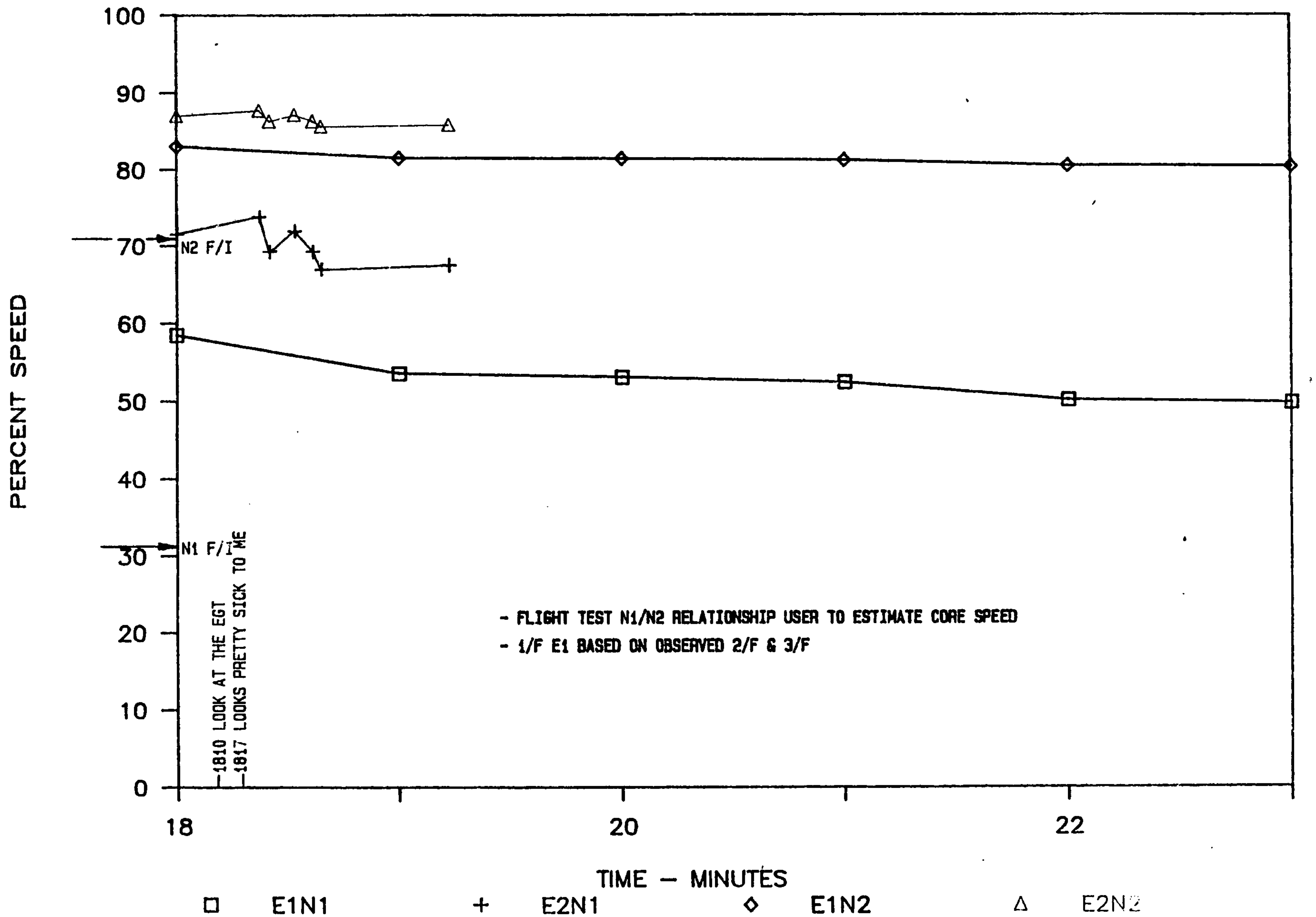

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FIGURE 6

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

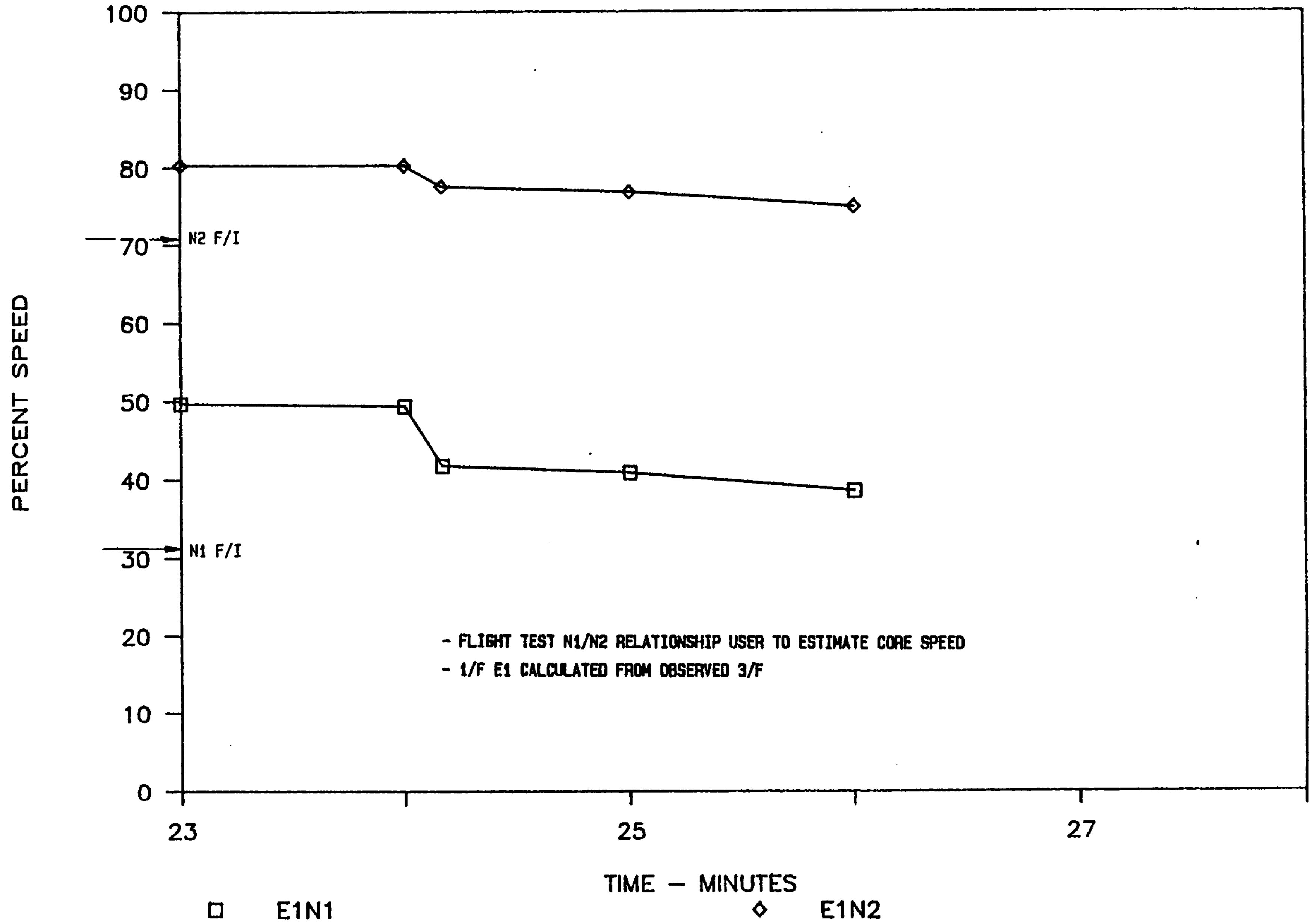

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FIGURE 7

CONTINENTAL FL 522 POWER LOSS

ENGINE SPEED ESTIMATES

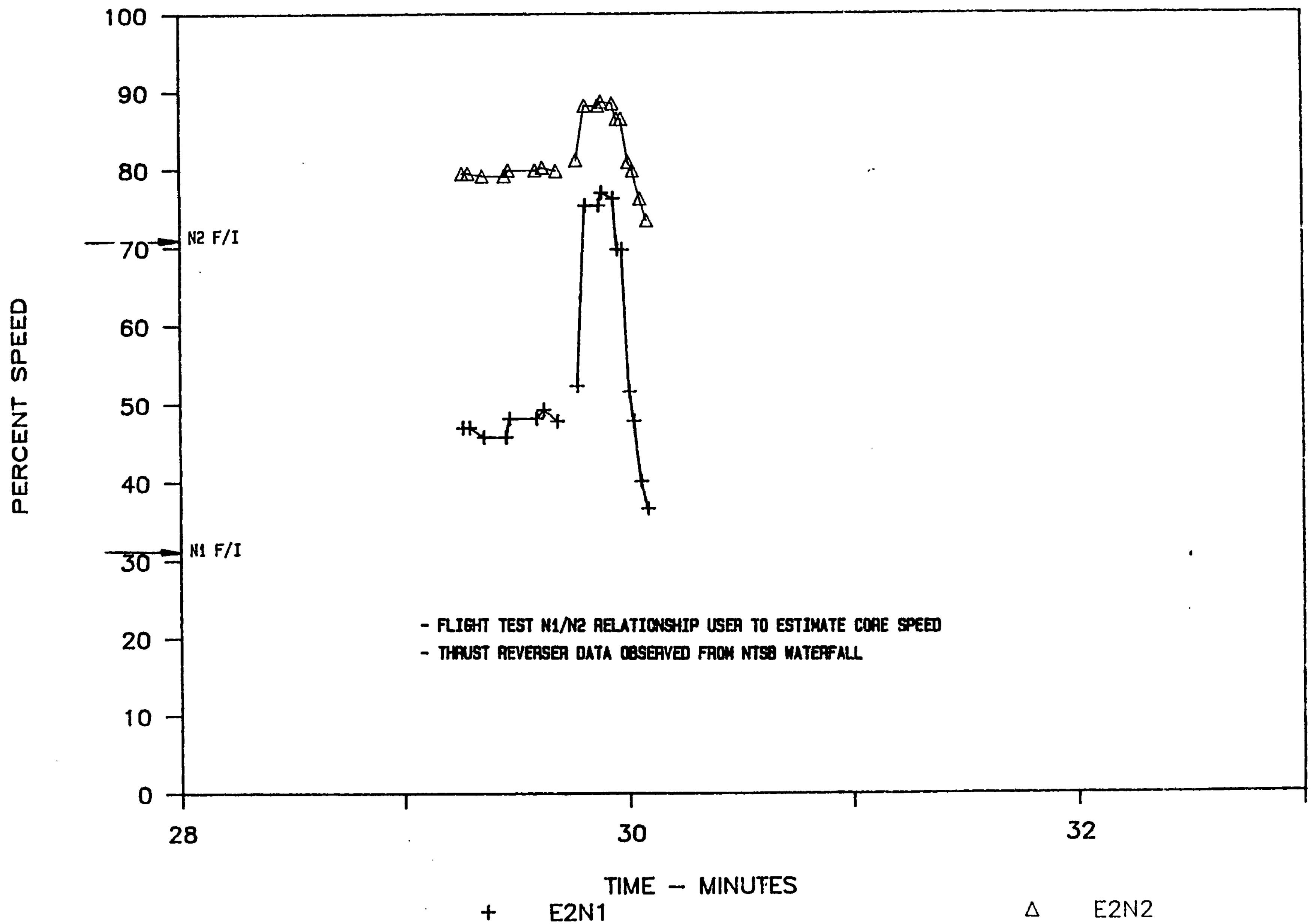


FIGURE 8
CONTINENTAL FL 522 POWER LOSS

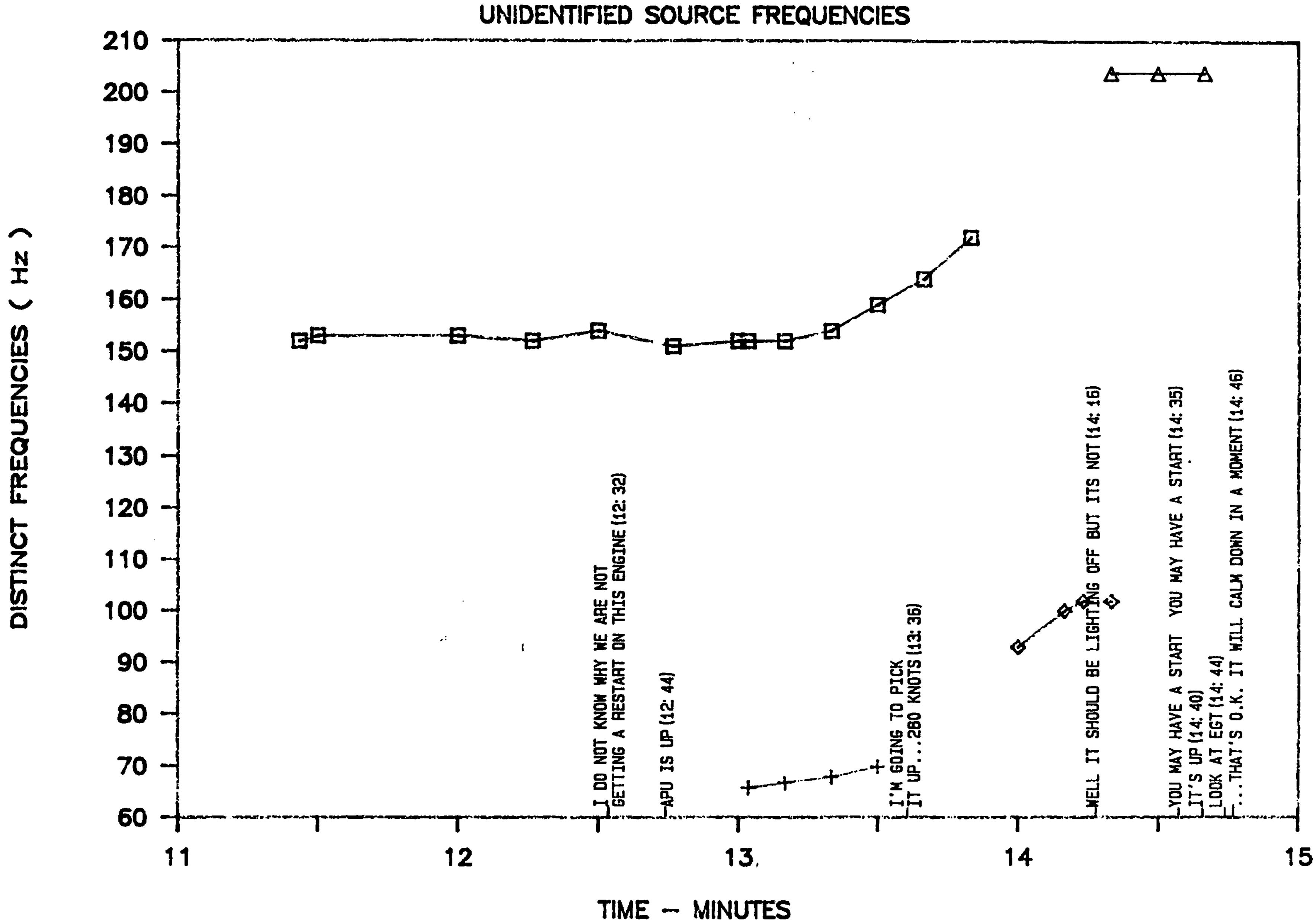
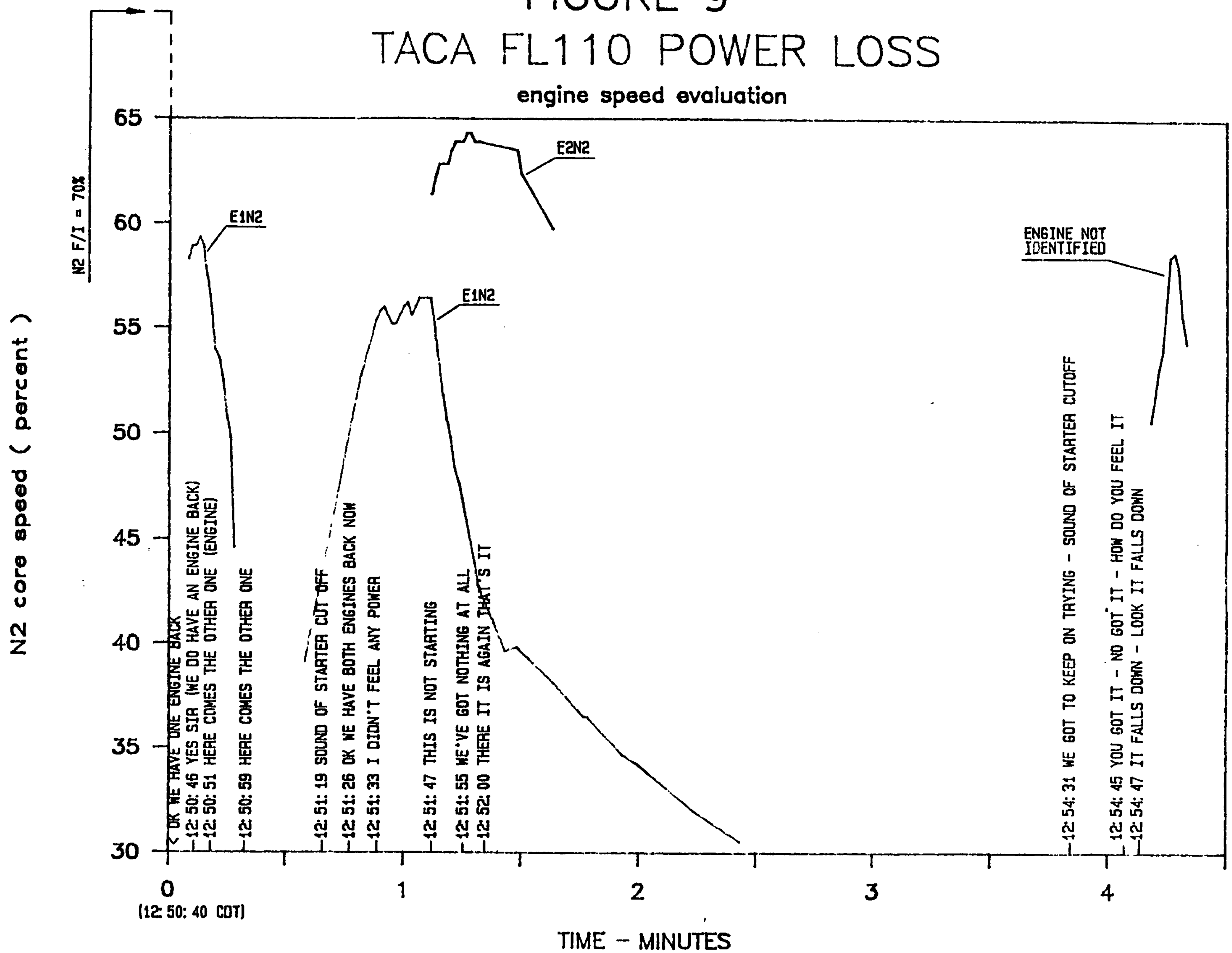


FIGURE 9

TACA FL110 POWER LOSS

engine speed evaluation



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General Electric Technical Report

GE Aircraft Engines

Commercial Product Support Department
General Electric Company
111 Merchant St., Cincinnati, OH 45246 USA

O-Ring Found in Aft Sump Lube Unit
Screen on A/C No. N75356
Engine Serial No. 721-971

M. Bernstein
W. Bruce
P. Gires
Y. Halin
L. Lundberg
P. Mouton
W. Porter
L. Volk
D. Wilson

June 2, 1988

J. P. Clark
Flight Safety Engineer

PSE had determined that the O-Ring removed from Engine Serial No. 721-971 Aft Sump screen has liberated itself from the inner sealing spool of the Lube Unit Aft Sump inner sealing spool. Please refer to Page 9 of the attached Service Bulletin for details of the exact location of the O-Ring. There have been three other cases of this O-Ring dislodging from the inner sealing spool reported in 737-300 fleet recently. It is PSE's opinion that the dislodging of this O-Ring is unrelated to the power loss on this aircraft.

If you have any further questions, please contact me at [redacted]

[redacted]

M. G. Charrier, Manager
CFM56 Systems

0227d

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TRANSMITTAL SHEET

CFM56-3/3B SERVICE BULLETIN REVISION

SERVICE BULLETIN (CFM56-3/3B) 79-015

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

October 15/87

This page transmits Revision 2 to Service Bulletin (CFM56-3/3B) 79-015, dated November 08/85 and Revision 1 dated November 10/86.

This revision is issued to modify:

- Paragraph 1.A. Effectivity, to add Engine Serial Numbers.
- Paragraph 3.A. Material Requirements. to update pricing and provisioning date.

The technical content of this revision is FAA and DGAC approved.

Changes are denoted by the letter R in the left hand margin.

This Service Bulletin is reissued in its entirety.

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SERVICE BULLETIN

1510S

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

1. PLANNING INFORMATION

A. Effectivity

Sealing spools P/N 335-295-701-0 and P/N 335-295-900-0 installed on CFM56-3 and 3B engines or stocked as spare parts are affected by this Service Bulletin.

NOTE: The new parts P/N 335-295-702-0 and P/N 335-295-901-0 announced by this Service Bulletin will be introduced in production as follows:

	Engines/Equipment	Serial Numbers
R	CFM56-3	720240 thru 720265, 720268
R		thru 720270, 720278, 720281,
R		720283, 720291 thru 720321,
R		720323 and up.
R		721215, 721237 thru 721252,
R		721254, 721256 thru 721259,
R		721262 thru 721362, 721368,
R		721369, 721372, 721374 thru
R		721614 and up.
R	CFM56-3B	720241 and up.
R		721615, 721618, 721712 and up.
	Lubrication Unit	4125, 4175 and up

B. Reason

(1) To introduce modified sealing spools above the magnetic plug.

(2) To simulate a maintenance error, the magnetic plugs were not installed on lubrication unit during an engine test.
The resulting leakage from the sealing spool exceeded acceptable level.

(3) Introduction of O-ring seals on inner and outer sealing spools will ensure the sealing even though magnetic plugs were not installed on lubrication unit.

C. Description

This Service Bulletin announces the introduction of new inner and outer sealing spools with groove to receive new O-ring seals. (See figure 1)

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cfm international **CFM56-3**

SERVICE BULLETIN

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

1. (Continued)

   D. Compliance

   It is recommended that this Service Bulletin be accomplished at the next shop visit.

   E. Approval

   The technical content of this Service Bulletin is FAA and DGAC approved.

   F. Manpower

   An estimated 5 man-hours per Lubrication Unit will be required to accomplish this Service Bulletin if the sealing spools are reworked by the airline.

   A labor credit allowance will be granted for each engine actually accomplished per the effectivity of this Service Bulletin (CFM56-3/3B) 79-015. To obtain the labor credit allowance, submit a Warranty Claim referencing this Service Bulletin (CFM56-3/3B) 79-015 to the following address:

   North & South America and Asia Customers

   CFM International
   Product Support Center
   111 Merchant Street
   Room 444
   Cincinnati, OH 45246

   Attn: Mgr, Warranty Admin
   Tele: 513-552-2204
   Rapifax: 513-552-2178

   Europe, Middle East, and Africa Region Customers

   CFM International
   c/o SNECMA Villaroche
   Commercial Logistic Product Support
   77550 Moissy Cramayel, France

   Attn: Mgr, Warranty Admin
   Tele: 33-6-066-8754
   Rapifax: 33-6-066-7202
   Telex: VILAV.69082[illegible]

   G. Material

   (1) The material required to accomplish this Service Bulletin is available from the engine manufacturer. To obtain this material, submit a Charge Purchase Order referencing this Service Bulletin CFM56-3/3B 79-015 to the following address.

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SERVICE BULLETIN

1. (Continued)

North & South America and Asia Customers

CFM International
Product Support Center
111 Merchant Street

Room 115
Cincinnati, OH 45215-6301

Attn: Mgr, Spare Parts Sales
Rapifax: 513-771-5575

Europe, Middle East, and Africa Region Customers

CFM International
c/o SNECMA Villaroche
Commercial Logistic Product Support
77550 Moissy Cramayel, France

Attn: Mgr, Spare Parts Sales
Tele: 33-6-066-8694
Rapifax: 33-6-066-7889
Tele: VILAV.690824

(2) A parts credit allowance will be granted for engines accomplished per the effectivity of this Service Bulletin. To obtain this parts credit allowance, submit a Warranty Claim referencing this Service Bulletin (CFM56-3/3B) 79-015 to the address stated in paragraph 1.F.

H. Tooling

No additional special tooling is required to accomplish this Service Bulletin.

I. Weight and Balance

Not affected.

J. References/Publications Affected

CFM56-3 Component Maintenance Manual CFMI-TP-CM49
CFM56-3 Engine Maintenance Manual CFMI-TP-MM6

NOTE: The following reference documents are for engine manufacturer's internal use only.

DCAS: 22290 (CAD: 15-42139)
DCAS: 22577 (CAD: 15-49045/05)
Warranty code 4SJ

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SERVICE BULLETIN

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

1. (Continued)

   K. Previous Modifications

   Service Bulletin (CFM56-3) - OIL SYSTEM - General - Spare Parts Release for Oil Tank and Lubrication Unit IPL (-3) and CFM56-3 IPC.

   Service Bulletin (CFM56-3) 79-005 - OIL SYSTEM - Lubrication Unit - Introduction of a New Sealing Spool above Magnetic Plug.

   Service Bulletin (CFM56-3) 79-012 - LUBRICATION SYSTEM - Lubrication Unit - Introduction of a New Magnetic Plug Assy with one Supplementary D-shaped Seal.

SERVICE BULLETIN

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

2. ACCOMPLISHMENT INSTRUCTIONS

A. Remove the lubrication unit from the engine per Engine Maintenance Manual 79-21-10 page block 201.

R B. Remove the 3 sealing spools P/N 335-295-701-0 and 3 sealing spools
R P/N 335-295-900-0 from the lubrication unit per Component Maintenance Manual,79-21-12. See figure 2.

C. Discard the O-rings.

D. Modify the 3 outer sealing spools P/N 335-295-701-0 per figure 3 (sheet 1 of 2).

E. Modify the 3 inner sealing spools P/N 335-295-900-0 per figure 3 (sheet 2 of 2).

F. Reidentify the 6 modified parts to new P/N 335-295-702-0 and P/N 335-295-901-0 using vibropeen method.

G. Recondition the sulphuric anodizing solution per Component Maintenance Manual Chapter Repair.

H. Clean all removed parts per Component Maintenance Manual chapter cleaning.

I. Install O-rings P/N 649-393-020-0 or P/N J221P020 in groove of sealing spools P/N 335-295-901-0.

J. Install O-rings P/N 649-393-028-0 or P/N J221P021 in groove of sealing spools P/N 335-295-702-0.

K. Install new O-rings where applicable.

L. Reassemble the Lubrication Unit per Component Maintenance Manual 79-21-12 page block 701.

M. No reidentification is provided for Lubrication Unit P/N 335-261-002-0 reworked in accordance with this Service Bulletin. Compliance may be indicated by marking this Service Bulletin number adjacent to the existing Part Number.

N. Reinstall the Lubrication Unit on the engine per Maintenance Manual, 79-21-10, page block 201.

O. Perform leak test with engine at idle per Maintenance Manual, 71-00-00.

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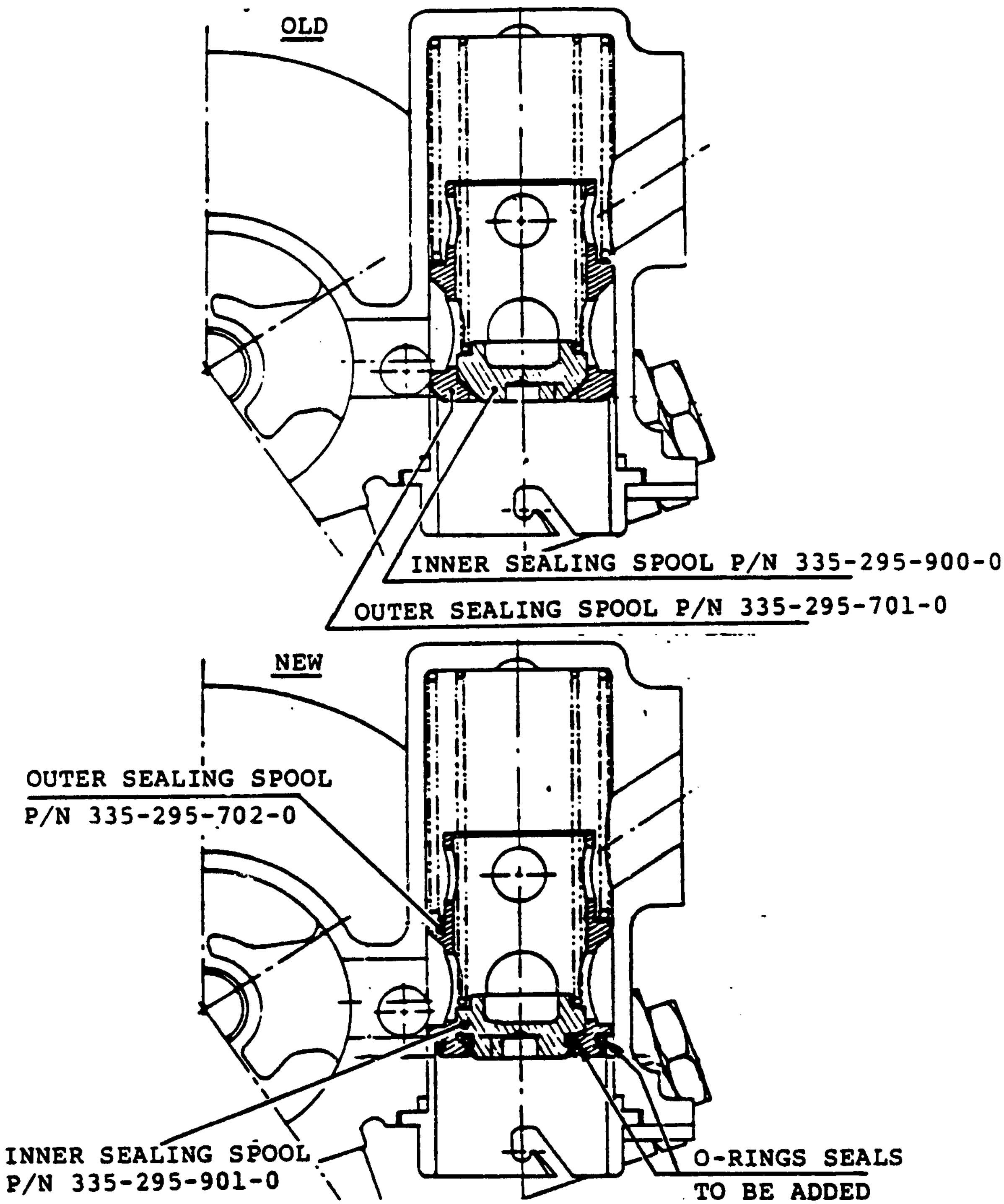
SERVICE BULLETIN

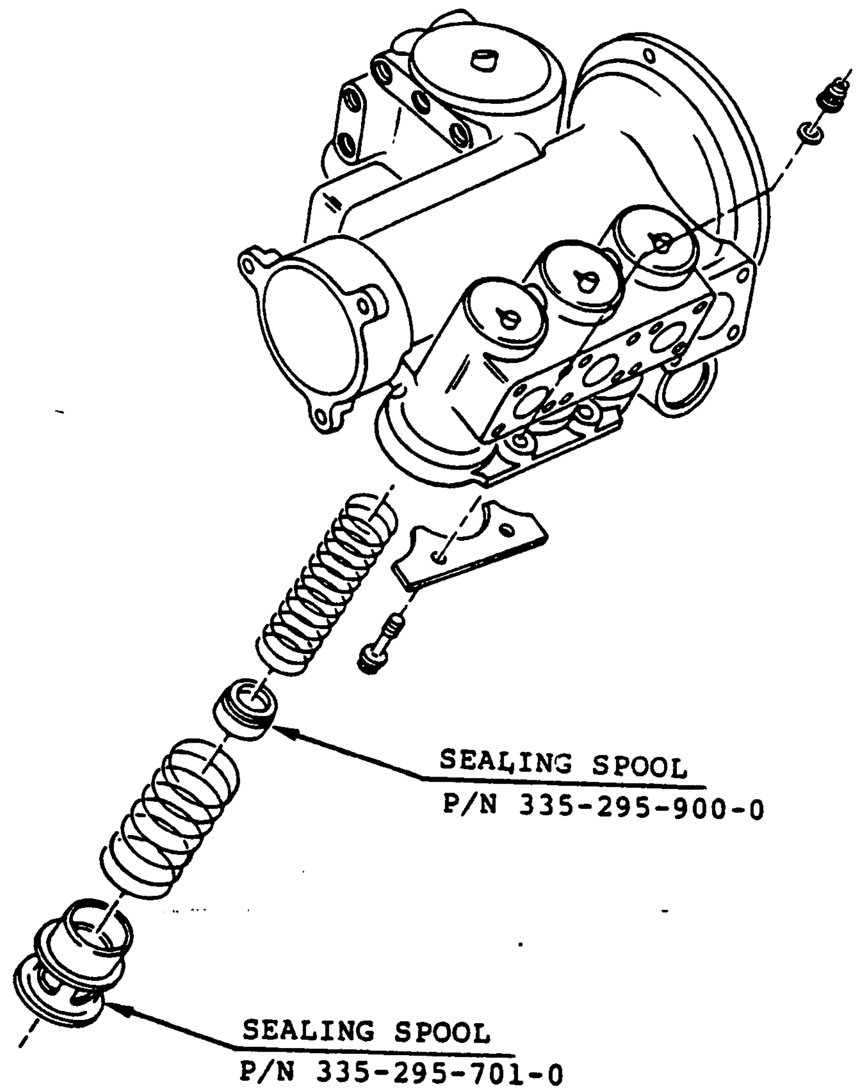
LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs



Modification of Inner and Outer Sealing Spools
Figure 1

SERVICE BULLETIN

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs



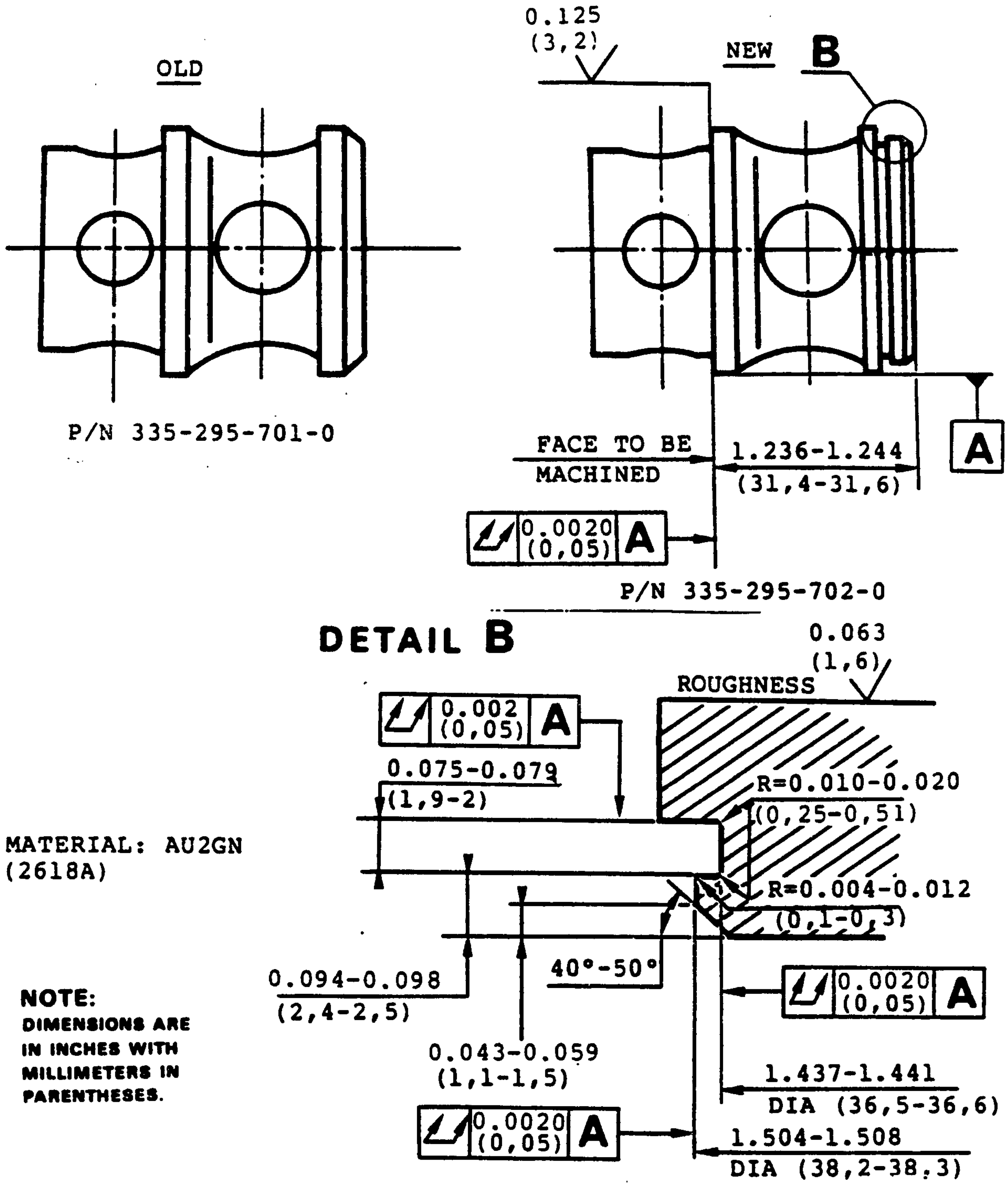
1/9-353-020-0
A 14
J221 P020

Removal/Installation of Sealing Spools
Figure 2

cfm international CFM56-3

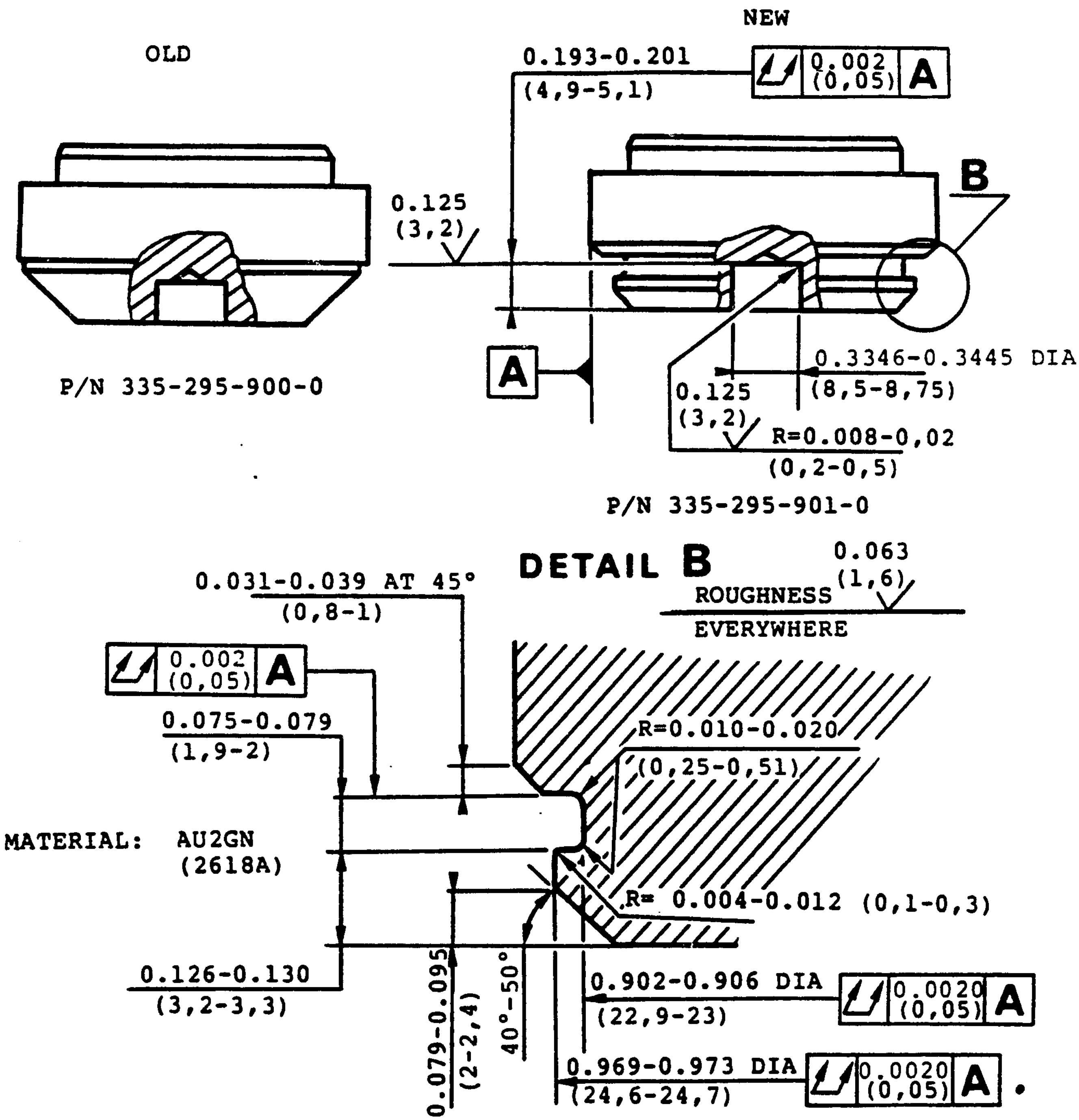
SERVICE BULLETIN

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools above Magnetic Plug



Modification of Outer Sealing Spool
Figure 3 (Sheet 1 of 2)

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs



Modification of the Inner Sealing Spool
Figure 3 (Sheet 2 of 2)

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

3. MATERIAL INFORMATION

A. Material Requirements

(1) The following material will be required, per engine, to accomplish this Service Bulletin.

	Part Number	Qty/ Eng	Unit Price $	Key Word	Pkg Qty	L/T#
	335-295-702-0	(3)	256.50	Spool-Sealing	(1)	60
	335-295-901-0	(3)	83.25	Spool-Sealing	(1)	60
	649-393-028-0	(3)	NP	Packing Preformed (O-ring)	-	-
R	or J221P028	(ALT)	0.61	Packing Preformed (O-ring)	(10)	30
	649-393-020-0	(3)	NP	Packing Preformed (O-ring)	-	-
R	or J221P020	(ALT)	0.32	Packing Preformed (O-ring)	(25)	30

(2) The following consumable products will be required, per engine, to accomplish this Service Bulletin.

	Part Number	Qty/ Eng	Unit Price $	Key Word	Pkg Qty	L/T#
	649-393-028-0*	(3)	NP	Packing-Preformed (O-ring)	-	-
R	or J221P028*	(ALT)	0.61	Packing-Preformed (O-ring)	(10)	30

Replenishment Lead Time (L/T) in days.

3. A. (2) (Continued)

Part Number	Qty/ Eng	Unit Price $	Key Word	Pkg Qty	L/T#
649-393-130-0	(3)	1.48	Packing-Preformed (O-ring)	(50)	30
649-393-018-0	(1)	0.20	Packing-Preformed (O-ring)	(25)	30
649-393-240-0	(1)	2.90	Packing-Preformed (O-ring)	(10)	30

\# Replenishment Lead Time (L/T) in days.

* Introduced by Service Bulletin 79-002.

NOTE: Pricing information is furnished solely for planning purposes.

B. Configuration Chart

(1) Production

New P/N	Qty/ Eng	Key Word	Od P/N	Qty/ Eng	Operation	Chg Cod	Supt Code
Engine Section 72-00-00							
335-261-002-0	(1)	Lubrication Unit	335-261-002-0 (NOT YET in IPC*) (NOT YET in CMM)	(1)	Remains	-	-
.335-295-702-0	(3)	Spool-Sealing	.335-295-701-0 (NOT YET in CMM)**	(3)	Replaced	4	A
.649-393-028-0	(3)	Packing Preformed (O-ring)	-	-	Added	0	-
or .J221P028	(ALT)	Packing Preformed (O-ring)	-	-	Added	0	-

LUBRICATION SYSTEM - Lubrication Unit - Introduction of New Sealing Spools Associated with the Magnetic Plugs

3. C. (Continued)

New P/N	Qty/ Eng	Key Word	Od P/N	Qty/ Eng	Operation	Chg Cod	Supt Code
.649-393-020-0	(3)	Packing-Preformed (O-ring)	-	-	Added	0	-
or .J221P020	(ALT)	Packing-Preformed (O-ring)	-	-	Added	0	-

* Introduced by Service Bulletin 79-012

** Introduced by Service Bulletin 79-005

NOTE 1: Change Code

0 = Parts added or quantity increased

4 = Old and new part fully interchangeable.

NOTE 2: Support Code

A = Old parts will no longer be supplied

B = Old parts will be supplied until inventory is depleted

D. Interchangeability

Physical interchangeability is not affected.

R However the new sealing spools ensure good sealing, if the magnetic plugs are not installed on the lubrication unit.

E. Parts Disposition

Serviceable old parts may be used or reworked per this Service Bulletin.

General Electric Metallurgical Report

GENERAL ELECTRIC

TECHNICAL MEMORANDUM

OPERATION	
EMTL/FAILURE ANALYSIS & SERVICE EVALUATION	
PROJECT: 6895	T.M. NUMBER: 88-281
G.E. CLASS: III	
TITLE: METALLURGICAL ANALYSIS OF DEBRIS REMOVED FROM THE EXHAUST NOZZLE OF CFM56-3 S/N 721-973	
PREPARED BY: J.P. Smith [redacted]	DATE: 6/29/88
APPROVED BY: M.D. Mulkey [redacted]	DATE: 6/29/88

THE DISTRIBUTION OF THIS TM IS LIMITED TO THE BELOW NAMED INDIVIDUALS, EXCEPT AS APPROVED IN ACCORDANCE WITH THE REQUIREMENTS OF AEBG INSTRUCTION 630.10, APPENDIX A.

DISTRIBUTION:

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Lynn Technical Information Center, 24001	- 3 copies of Lynn TM's - 1 copy of Evendale TM's
Records Retention - **Lynn only** - 3109A	- master plus 5 copies

MAE LOCATION

- ☒ EMTL
- ☐ TL
- ☐ M & PLAB

INVESTIGATION TYPE (IT)

- ☒ FAILURE (FI)
- ☐ REPAIR (RI)
- ☐ COND MONITORING (CI)

GOVERNMENT PROPERTY ☐ YES ☒ NO

AUTHORIZATION FOR DESTRUCTIVE EVALUATION

NAME NO DESTRUCTIVE EVALUATION

DATE WITHOUT NTSB APPROVAL

APPROVAL TO PROCESS INVESTIGATION

FILE CODE	REQUEST DATE (YR MO DA)	MAE ENGINEER	PH	RESPONSIBLE FA ENGINEER	FA LOG NO.
1	88 06 07			SMITH	C006895

ENGINE	ENGINE MODEL	ENGINE S/N	MATERIAL	ENGINE AREA	COMPONENT NAME
CFM56	-3	721-973	UNK	EXN	DEBRIS

IT	CUSTOMER LOG NO.	AIRLINE	FAILURE CONSEQUENCES	FAILURE DATE (YR MO DA)	ENGINE TSN/CSN
FI		TA	IFSD		

FILE CODE	COMPONENT P/N	COMPONENT S/N	COMPONENT TSN/CSN
2			/

MATERIAL SPEC.	MATERIAL FORM	DESIGN ENGINEER	M/D	PH
		STOW		

EST. REPORT DATES VERBAL (YR MO DA)	WRITTEN (YR MO DA)	CATEGORY	PRIORITY	ASE (PROJECT) ENGINEER	M/D	PH
88 06 10		2	A			

INVESTIGATION BACKGROUND

CIRCUMSTANCES SURROUNDING FAILURE

DEBRIS REMOVED FROM EXHAUST FOLLOWING LANDING OF B737

ON STRIP OUTSIDE NEW ORLEANS - TWO ENGINE FLAMEOUT

SIMILAR PAST FAILURES

PROCESSING AND INSPECTION INFORMATION

LPT STG 2 VANE DISTRESS (R'77) OBSERVED

POST FAILURE EVENTS

WORK SCOPE

IDENTIFY AND DOCUMENT PARTICLES AND DETERMINE

IF MATERIAL IS TYPICAL OR FOREIGN TO ENGINE

MATERIAL DISPOSITION

RETURN TO J. STOW LOCATION SCRAP

MAE USE ONLY

FILE CODE	REPORT DATE (YR MO DA)	REPORT IDENTITY	INITIATION SITE
3	88 06 29	TM88-281	

DISCRIP MECH	INIT MODE	PROP MODE	GSN	GRAIN TYPE	HDNS	HDNS SCALE

Log No. 6895
TM No. 88-281

SYNOPSIS

A TACA B737 experienced a two engine flameout during landing near New Orleans. Subsequent inspection of the CFM56-3 engines revealed LPT stage 2 vane distress and debris in the exhaust nozzle on one of the engines. SEM analysis of the debris showed the particles in the debris were all of essentially the same composition and most probably were Rene'77. Evidence of melting was seen on most of the particles.

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INTRODUCTION

Debris collected from the exhaust nozzle, following a two engine flameout of a CFM56-3 powered B737, was submitted for identification. Although both engines were involved in the incident, significant debris was found in only one engine. Scanning Electron Microscope-Electron Dispersive Spectroscopy (SEM-EDS) analysis was used to identify the individual particles making up the debris.

ANALYSIS

A photograph of the submitted debris is shown in Figure 1. In order to facilitate analysis, the particles were first ultrasonically cleaned in acetone and methanol. Next, the larger particles were separated using a pair of tweezers; mounted on double backed tape; and vapor coated with a thin film of carbon for SEM examination. The remaining, finer particles, were then mounted and processed in a like manner.

SEM photographs of most of the particles are shown in Figures 2 and 3. In order to get a qualitative overview as to whether or not the debris contained more than one alloy, they were examined in the backscatter mode (BSE). This mode accentuates differences in compositions. As seen in Figure 2, all of the particles have essentially the same grey-black tones; this indicates that they are all probably the same alloy. The same observation was also made for the larger particles.

In order to verify this observation, SEM-EDS spectra were obtained for most particles. The spectra all were quite simiiar. A computer match of the acquired spectra with standards in the system library indicated that the best match was with Rene'77 and Waspaloy; their spectra are shown in Figure 5. In neither case was the match perfect; however, this is not unusual when dealing with debris since there is almost always some oxidation, smearing, etc. to contaminate the sample. A close scrutiny of the acquired spectra with the particles' spectra indicates that the debris is more likely to be Rene'77. This is based on examination of the relative heights of the Mo and Ni peaks. The Cr, Al, and Ti peak heights are not too reliable because they are easily affected by oxidation and engine generated rub debris from coatings, blades, etc.

Another observation that was made is that almost all of the particles exhibited evidence of melting, see Figure 6. The melting range for Rene'77 is 2350°F - 2490°F. The presence of droplets would indicate that melting was complete; therefore, it can be concluded that the particles had been exposed to a temperature of at least 2490°F.

CONCLUSIONS

Based on SEM-EDS analysis of the debris it is concluded that the particles are either Rene'77 or Waspaloy; Rene'77 is the more likely of the two. The particles have been exposed at temperatures of at least 2490°F.

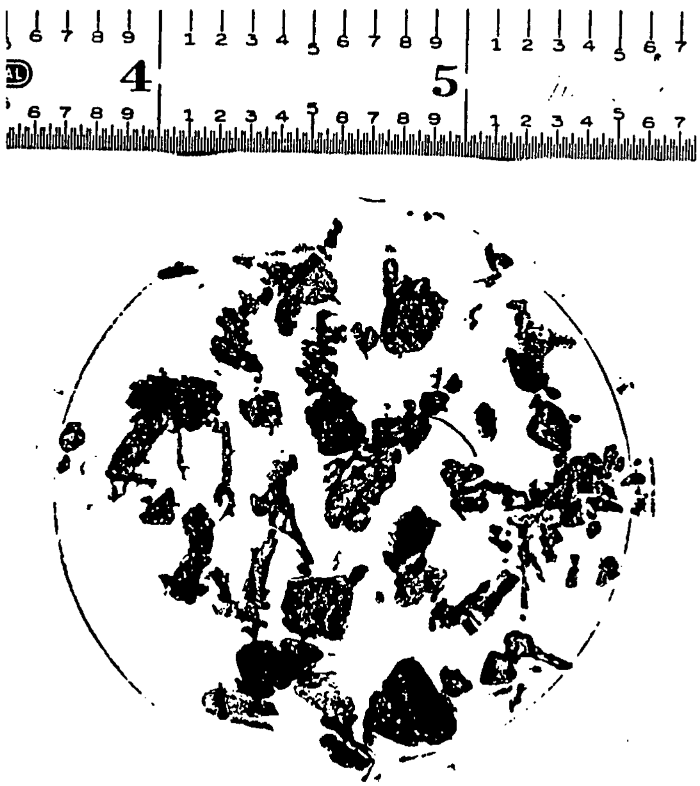

Figure 1. Overall photograph of debris removed from the exhaust nozzle of CFM56-3 S/N 721-973 following landing of TACA B737 near New Orleans.

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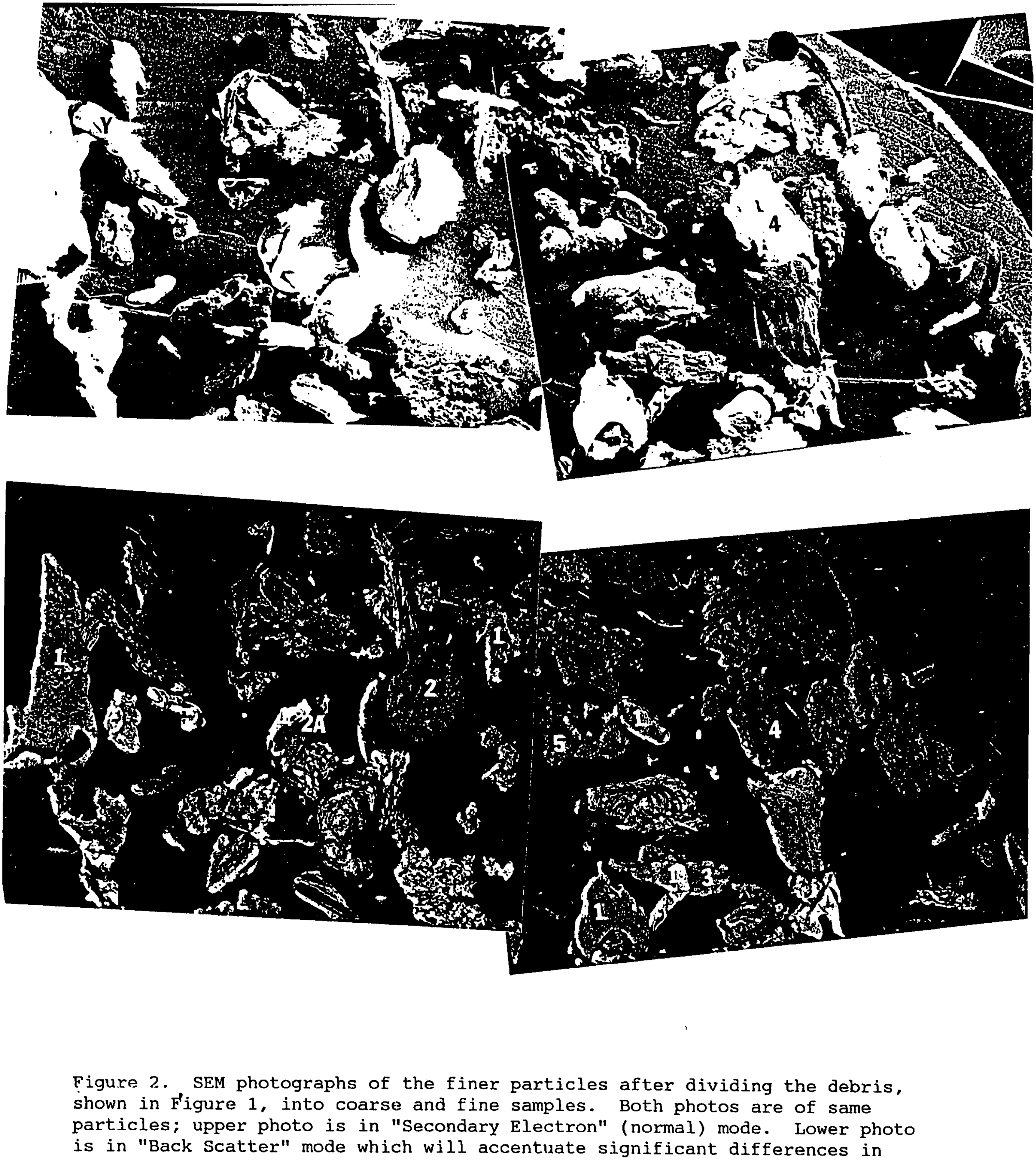

Figure 2. SEM photographs of the finer particles after dividing the debris, shown in Figure 1, into coarse and fine samples. Both photos are of same particles; upper photo is in "Secondary Electron" (normal) mode. Lower photo is in "Back Scatter" mode which will accentuate significant differences in composition. Note that no large differences are seen; this indicates that all particles are of generally the same alloy. Numbers on particles refer to SEM-EDS spectra in Figure 4. 5X

NO PHOTO NUMBER ASSIGNED

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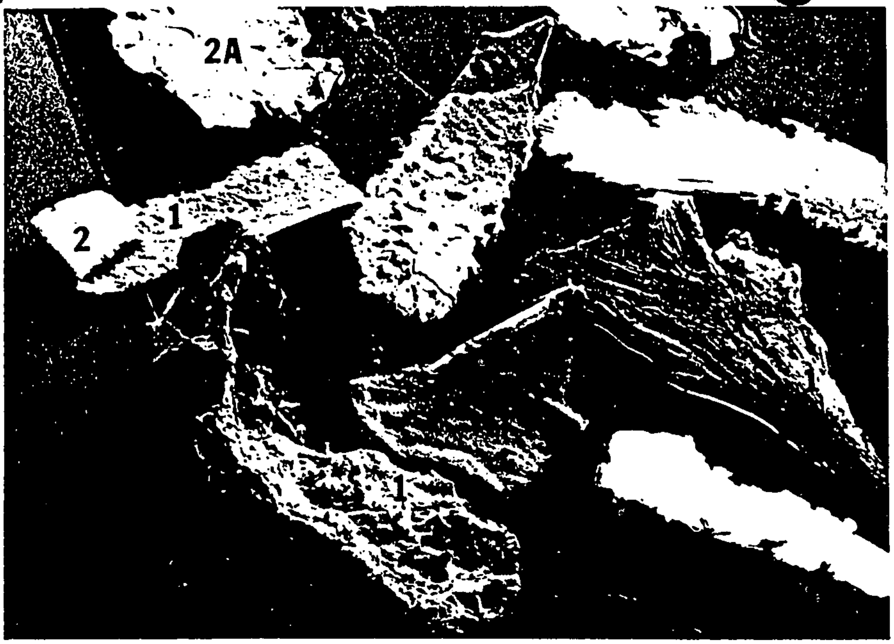

7X

8X

Figure 3., SEM photograph of the larger particles after dividing the debris, shown in Figure 1, into coarse and fine samples. Numbers refer to SEM-EDS spectrum in Figure 4 which was measured for the individual particles.

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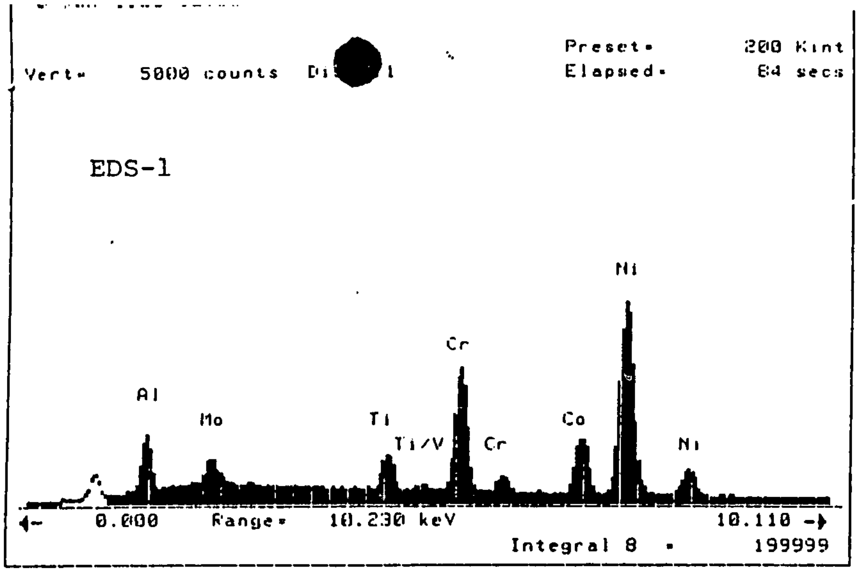

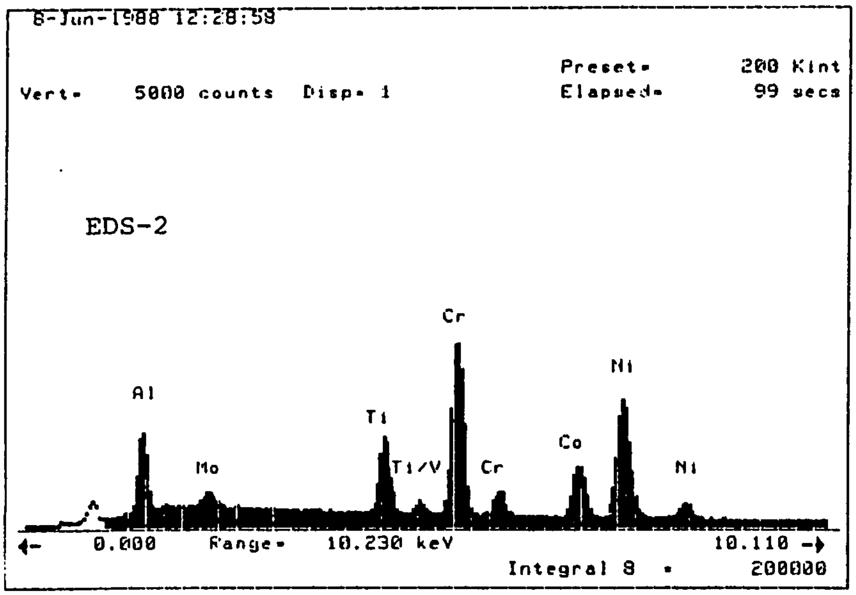

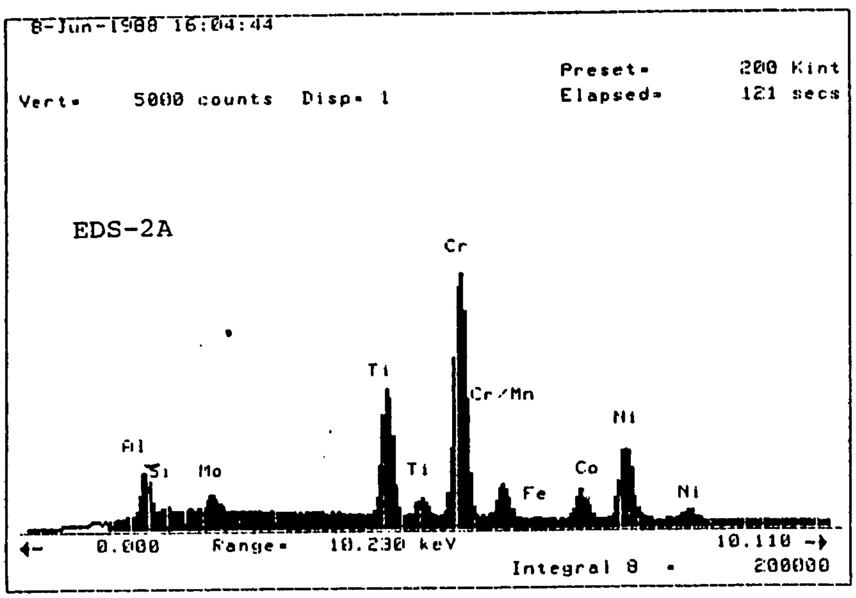

Figure 4A. SEM-EDS spectra of particles as indicated in Figures 2 and 3.

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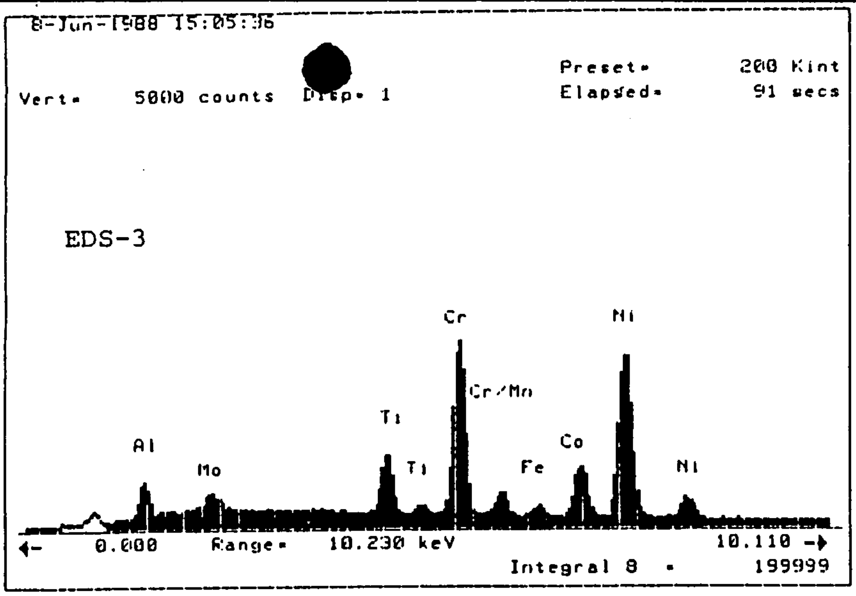

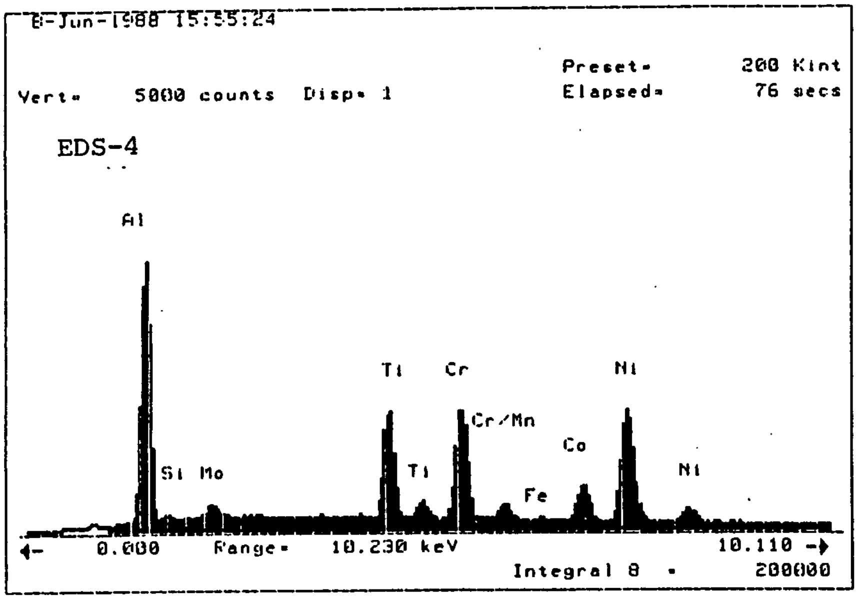

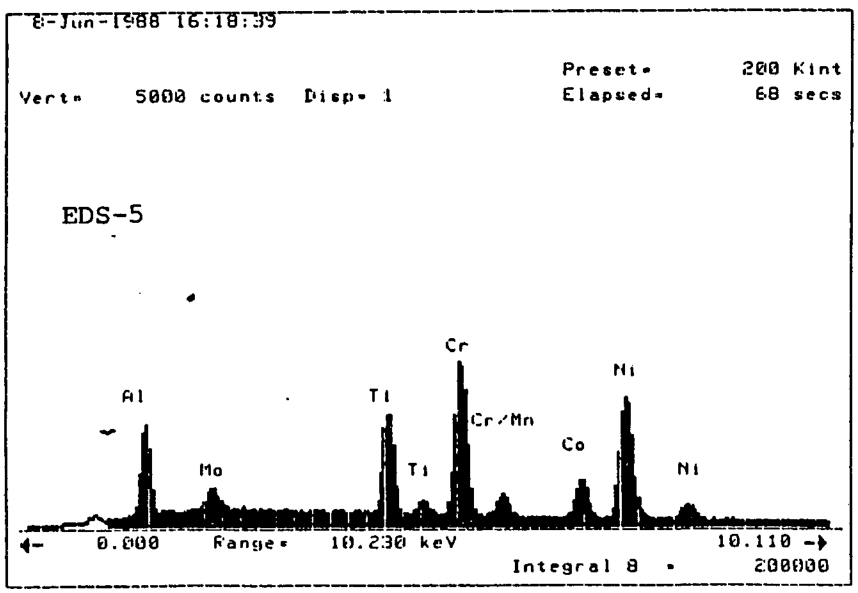

Figure 4[illegible] SEM-EDS spectra of particles as indicated in Figures 2 and 3.

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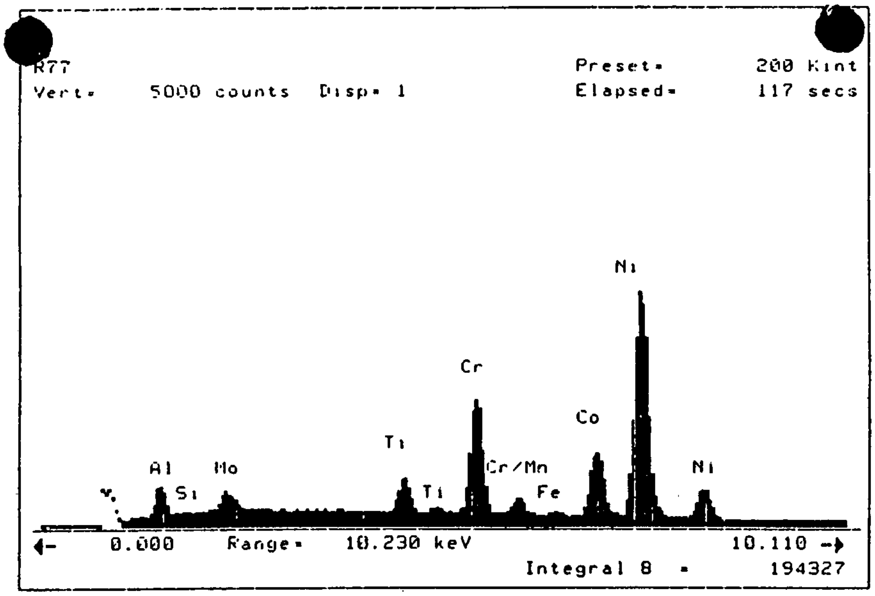

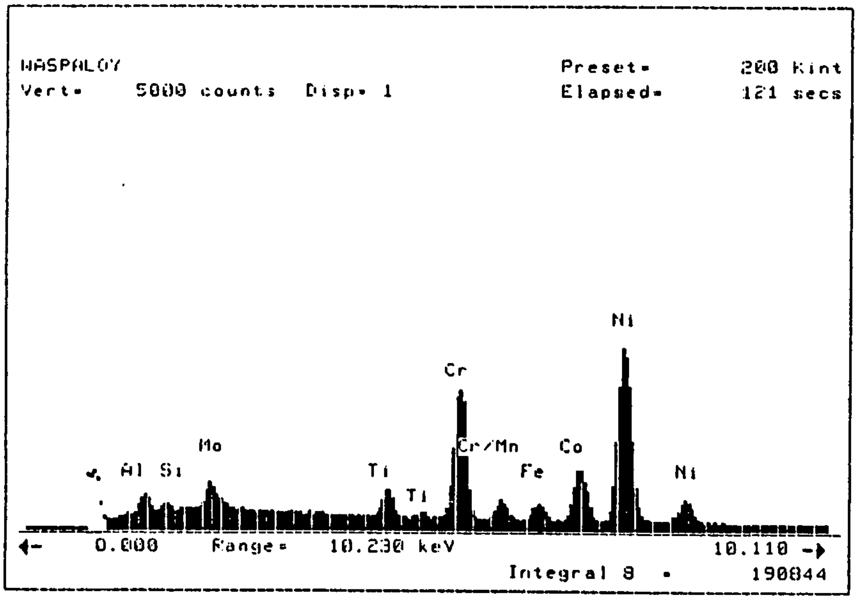

Figure 5. SEM-EDS spectra for Rene' 77 (upper) and Waspaloy (lower).

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55X

58X

Figure 6. Representative photographs showing evidence of melting. Most of the particles exhibited similar features indicating that debris had been molten.

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TM No. 88-281

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General Electric Materials Report

GE Corporate R&D Center
Materials Characterization
Scanning Electron Microscopy

TO: Ken Dunaway
FROM: Craig Robertson
JOB: 0951
SUBJECT: analysis of aircraft fuel filters
SAMPLE ID:
two CFM56-3 main engine fuel filters: Engine 1 and Engine 2
two patch filters #7500501 I and II

Summary: The patch filters had almost no contaminates. The main filters showed some light contamination from sealants, metal and other particles.

METHOD: The outer wrappers of the filters were removed and examined using a binocular light microscope. Then the inner filter elements were similarly examined. Six pleats were removed as a sample for further tests. The material in two of the pleats on each filter were removed and weighed. The filter debris was then studied using a Hitachi S-520 scanning electron microscope equipped with an energy dispersive x-ray analyzer. Finally the cleaned filter pleats were examined for any residual debris.

ANALYSIS: Patch filter I showed no contamination except for one Al particle. Patch filter II had only one black sliver/fiber on it. Main engine filter #1 had 53 pleats in it. The total weight of contaminants (based on an average of two pleats) on the filter was 630 mgs. The debris was concentrated in the bottom of the pleats in the lower third of the filter opposite the ink printing of TRW#. Main engine filter #2 was constructed with 55 pleats. The total debris was estimated to be approximately 170mgs. The debris was evenly distributed from one end of the filter to the other. The debris was again mainly in the bottom of the pleats. The make-up of the debris was similar in both filters. Thirty-five percent(by apparent volume) was aluminum metal shavings(see pictures 095108,10 and 13) ranging in size from 200um to 1200um with an average size of 500um. Forty percent of the debris consisted of yellow flakes and yellow coated yellowish green material(see picture 095100). X-ray spectra of these particles match those for known fuel tank sealants previously studied(see spectra 095101, 004500 and 004501). The remaining twenty-five percent of the contaminants consists of loose fibers similar to the filter itself, several cotton-like fibers, chunks of material similar to the fillers used in the fuel tank sealants,and black shiney straight slivers/fibers. The black slivers (pic095103) range in size from 1mm to 20mm in length with an aver age between 8 and 10mm. The have an x-ray spectrum (095103) indicative of an organic polymer of some sort perhaps a rubber which contains carbon, oxygen ,sulfur , and possibly elements lower in atomic number than carbon. Every pleat examined had at least some of these slivers. The sealant fillers were smaller than 100um but stuck to other objects(see picture 095120 and spectrum

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095107). The filters were examined after the debris had been removed in order to verify that they were not clogged (pic095122 & 23). Large area scans of the filter showed only background (spectrum 095108) with no elements above fluorine in atomic number present.

C.D. Robertson
Bldg. K-1 Room 2C20
[redacted]

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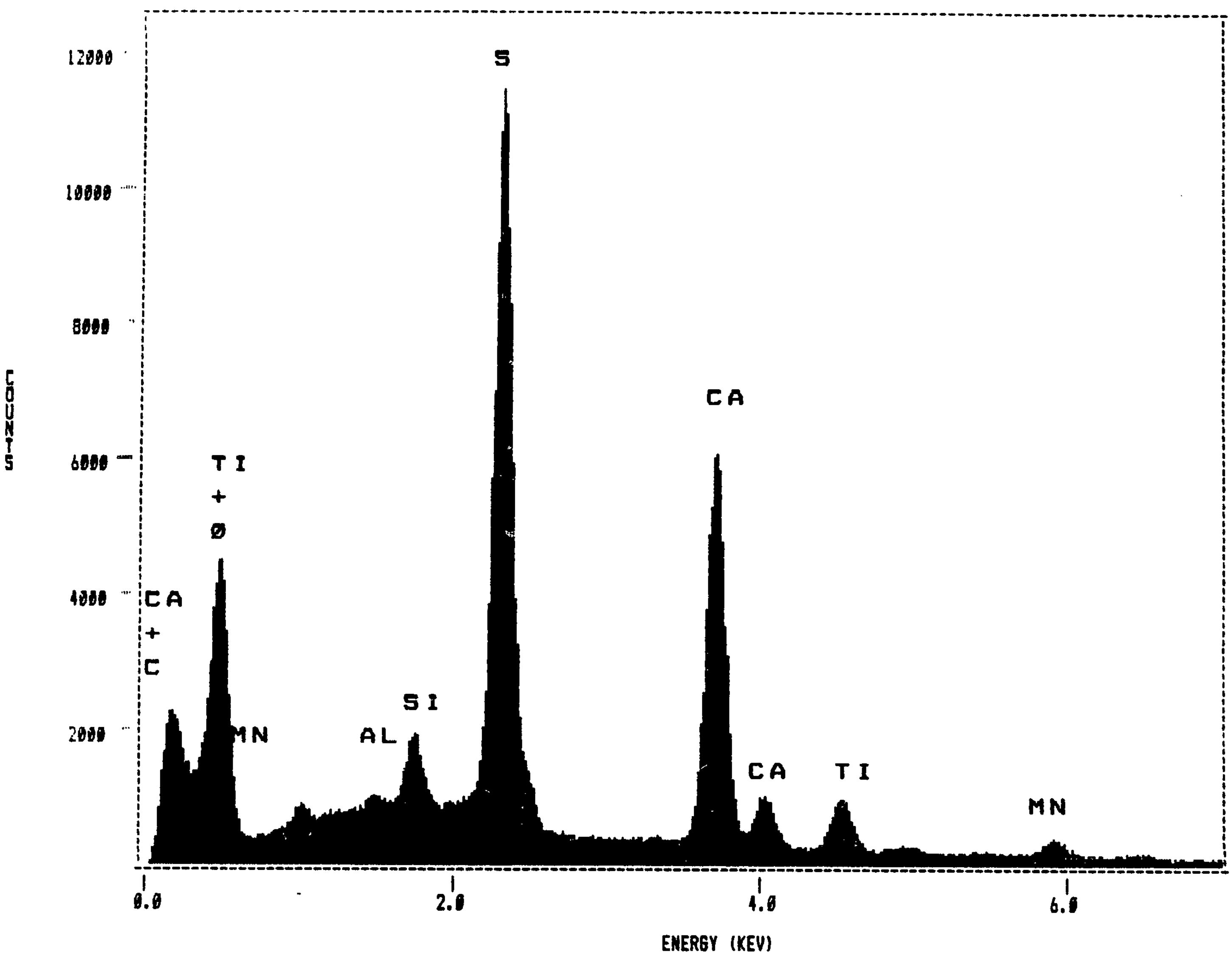
FILTER DEBRIS

SPECTRUM LABEL

PIC095100 SPOT 1

SPECTRUM FILE NAME

095101



γ PIGITI

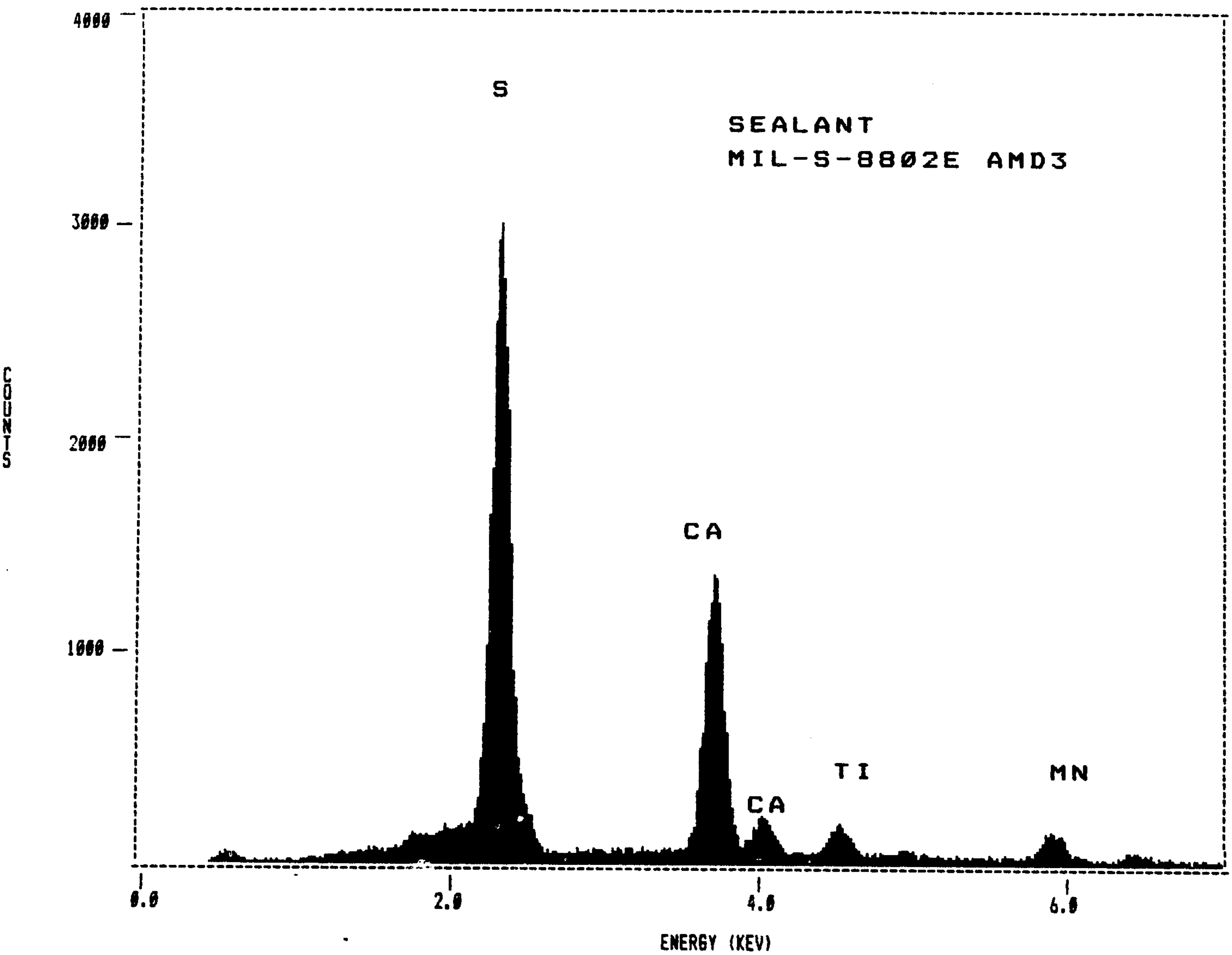
FUEL TANK SEALANT

SPECTRUM LABEL

SEALANT I 20KEV AREA SCAN

SPECTRUM FILE NAME

004500



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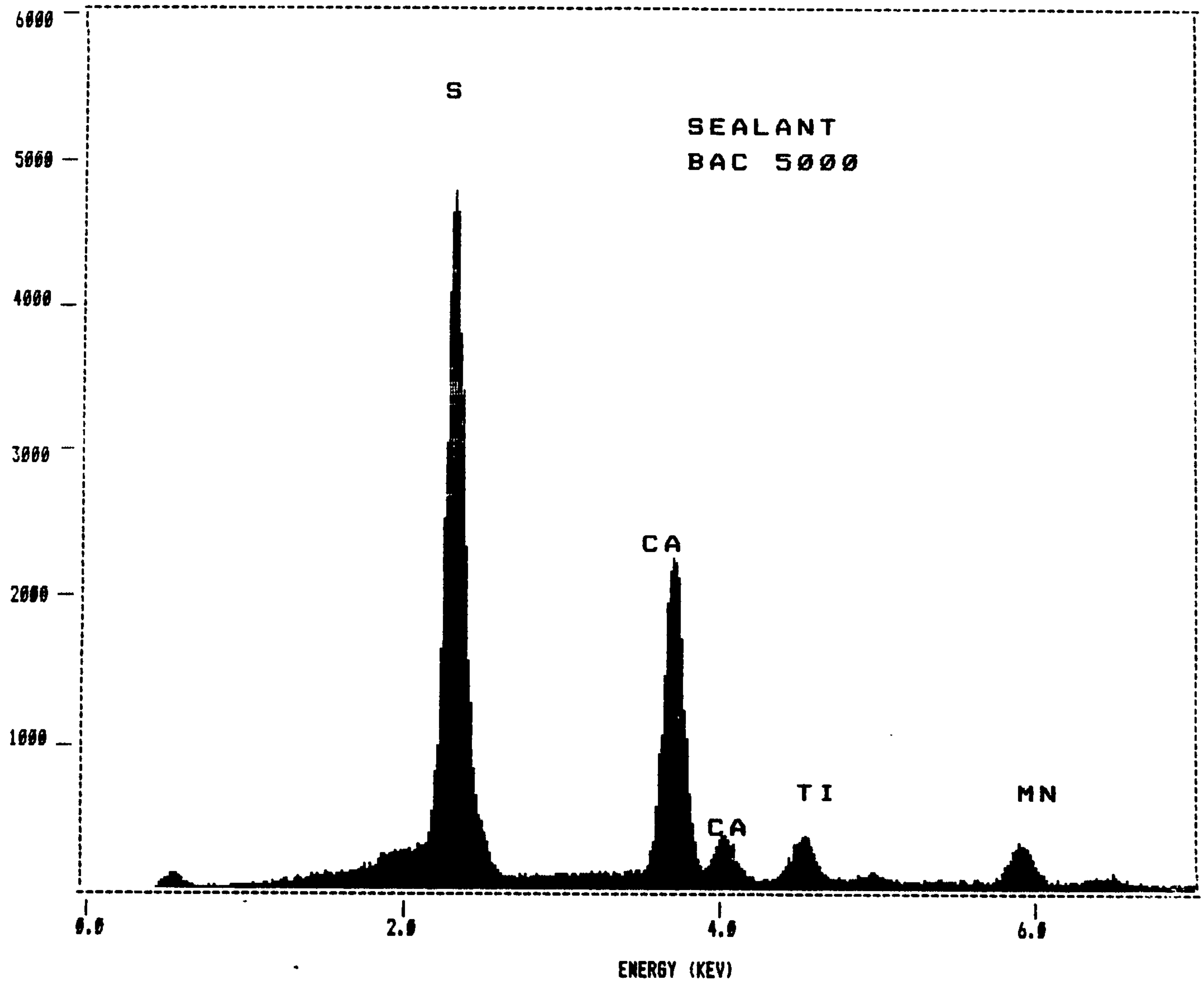
FUEL TANK SEALANT

SPECTRUM LABEL

SAMPLE II 20KEV AREA SCAN

SPECTRUM FILE NAME

004501



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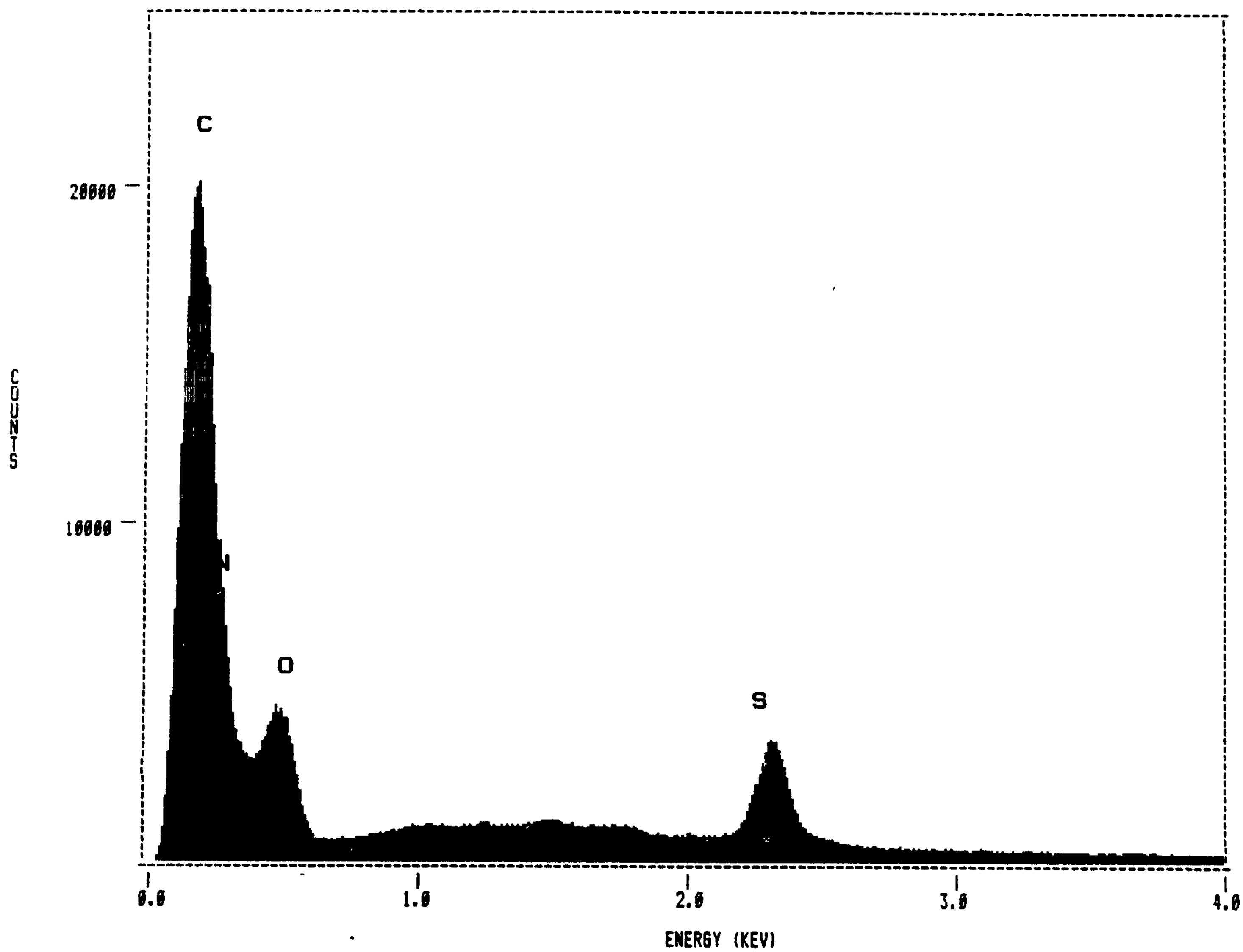
BLACK "FIBER"

SPECTRUM LABEL

PIC095103 10KEV

SPECTRUM FILE NAME

095103



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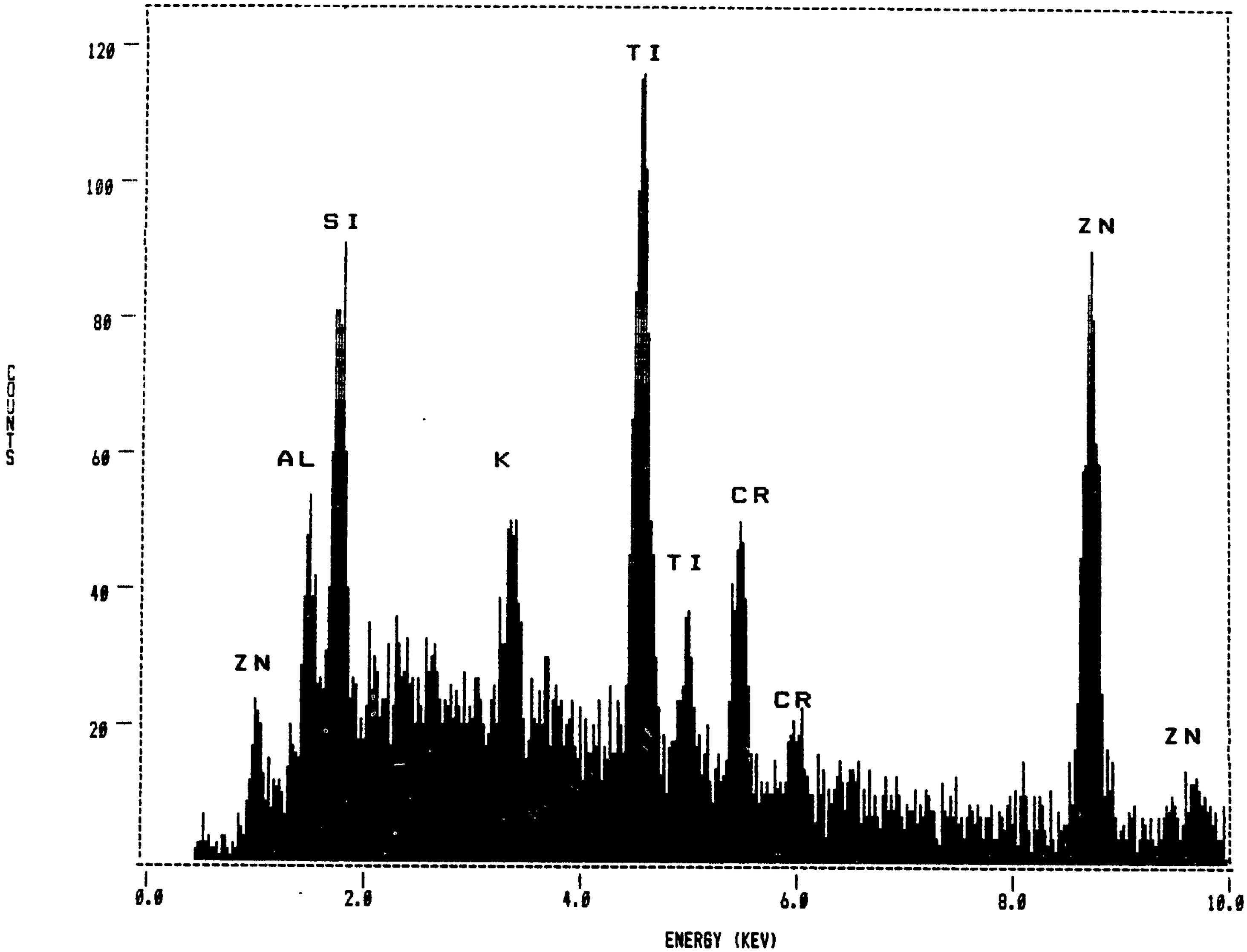
FILTER DEBRIS

SPECTRUM LABEL

PIC095120 PARTICLE ON FIBER

SPECTRUM FILE NAME

095107



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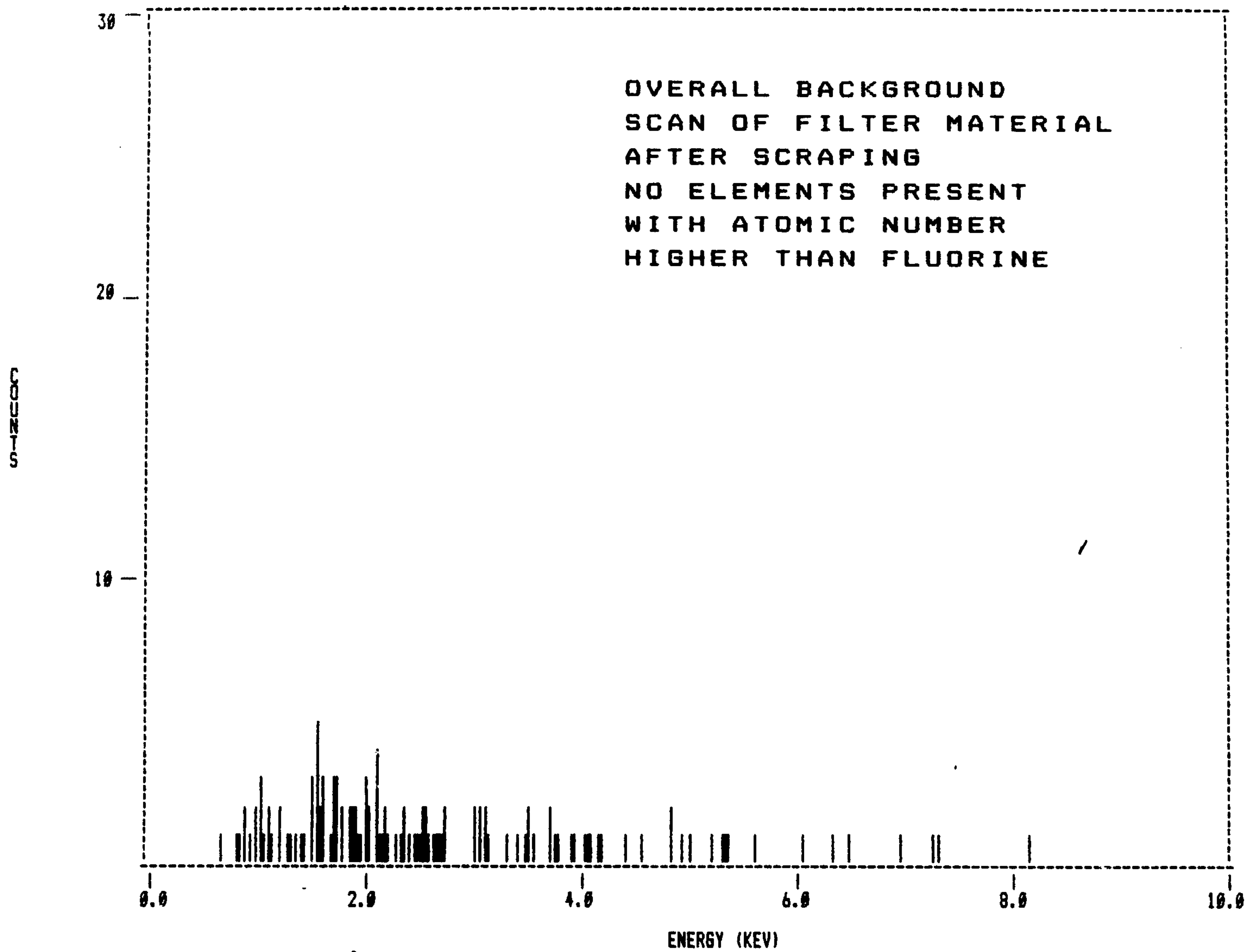
FILTER PAPER

SPECTRUM LABEL

[redacted] PIC095122 AREA SCAN

SPECTRUM FILE NAME

[redacted] 095108



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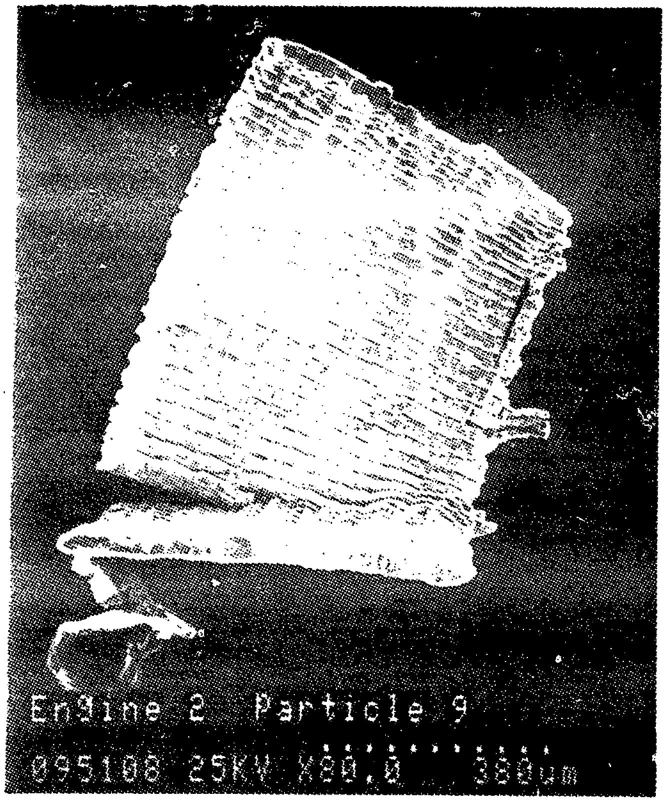
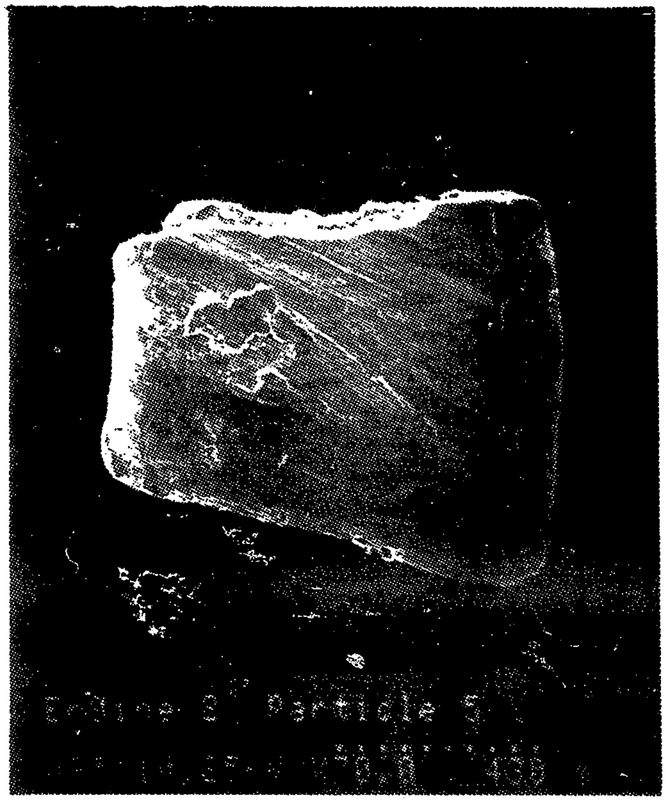
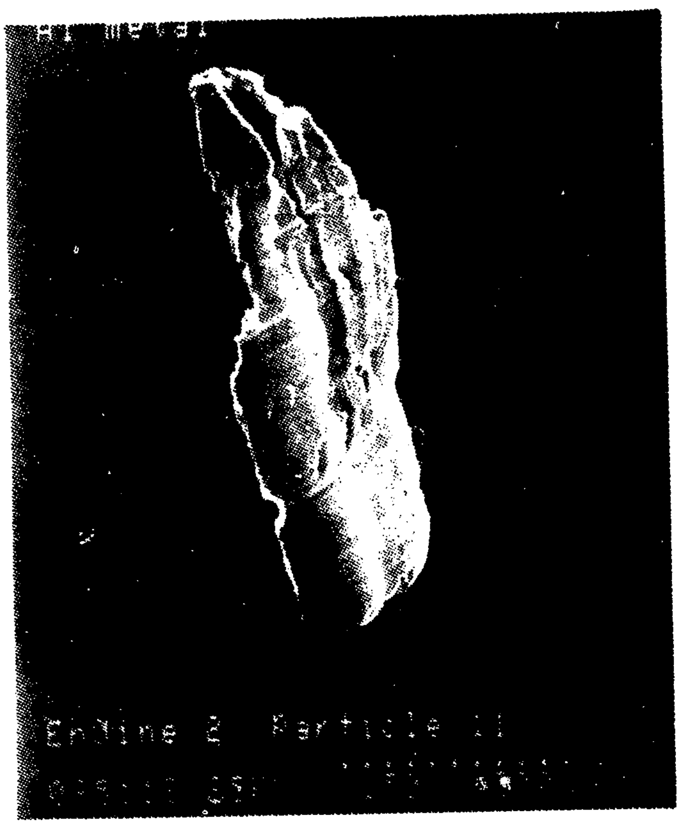
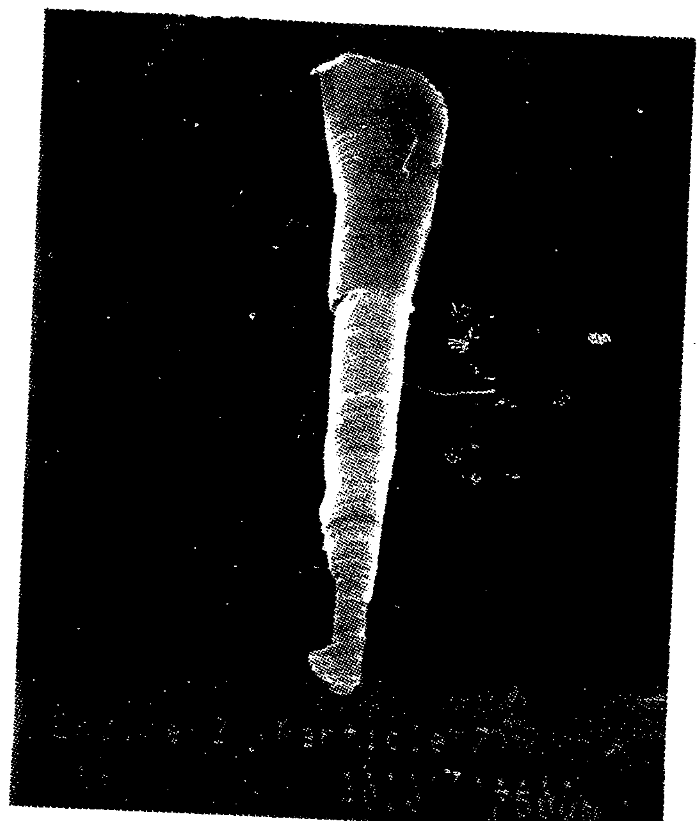
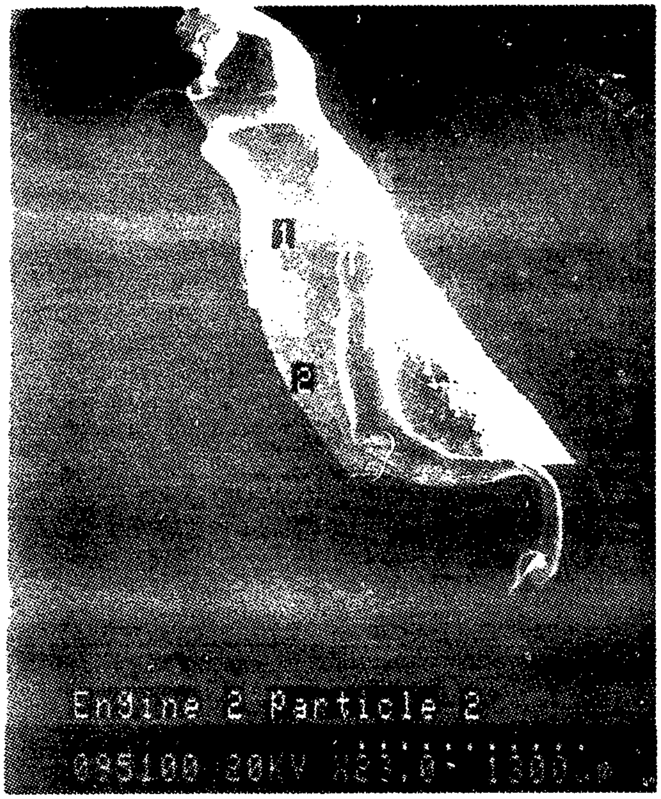
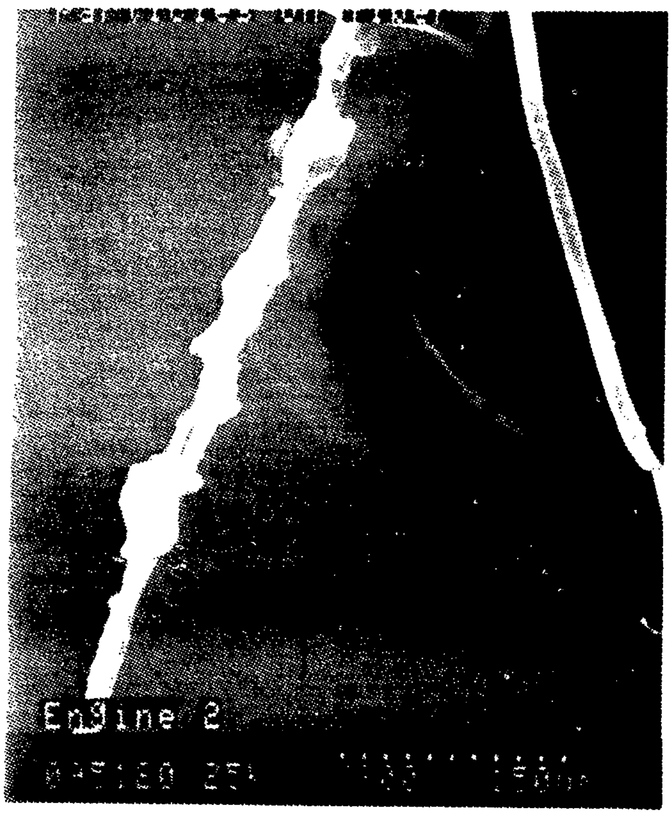

Engine 2 Particle 9
095108 25KV X80.0 380um




Al metal
Engine 2 Particle 11







380


engine 2 filter tank side
095122 10KV X70.0 430um


filter tank side
100u

Aviall Engineering Laboratory Report

COMPANY

CONFIDENTIAL

AVIALL

ENGINEERING LABORATORY REPORT

DATE 9/14/88 REPORT NO. 4278

PART:	LP Turbine Blades	P/N:	See Below S/N:
OPERATOR:	TACA	MATERIAL:	René 77
W.O.:	LR7928	ENG. MODEL:	CFM56-3-B1 S/N: 721973
ENGINE:	TSN Unknown CSN Unknown TSR Unknown CSR Unknown	PART:	TSN Unknown CSN Unknown TSR Unknown CSR Unknown

REASON FOR REQUEST: BDR: ☐ YES ☒ NO

Four (4) each blades from each of the 2nd, 3rd and 4th stages of the low turbine were submitted to the Metallurgical Laboratory for determination of operating temperature.

REQUESTED BY: M. Lindamood DATE: 9/8/88

ADDITIONAL INFORMATION:

Part Numbers: 2nd Stage: 301-330-217-0 - #'s 1, 40, 80, 120
3rd Stage: 301-330-321-0 - #'s 1, 39, 78, 117
4th Stage: 301-330-435-0 - #'s 1, 40, 80, 120

RESULTS:

1. The 2nd stage airfoils displayed a debris build-up on the leading edges but all four of the airfoils were intact, Fig. 1. The 3rd and 4th stage airfoils were also intact, Figs. 2 and 3.

2. Microsections were prepared from the airfoils and roots of each blade in accordance with the CFM56 Engine Shop Manual, 72-54-00, Special Procedure #1. The estimated temperatures experienced by each of the airfoils was determined as follows:

   2nd Stage:
   #1 - 1150°C (Figs. 4 and 5)
   #40 - 1150°C (Figs. 6 and 7)
   #80 - 1150°C (Figs. 8 and 9)
   #120 - 1150°C (Figs. 10 and 11)

   3rd Stage:
   #1 - 1050°C (Figs. 12 and 13)
   #39 - 1050°C (Figs. 14 and 15)
   #78 - 1050°C (Figs. 16 and 17)
   #117 - 1050°C (Figs. 18 and 19)

See Page 2

PREPARED BY: [redacted]

APPROVED BY: for T. Johnson

APPROVED BY:

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RESULTS (cont'd.):

4th Stage:

#1	-	< 1050°C	(No visible microstructure deviations between root and airfoil)
#40	-	< 1050°C	(No visible microstructure deviations between root and airfoil)
#80	-	< 1050°C	(No visible microstructure deviations between root and airfoil)
#120	-	< 1050°C	(No visible microstructure deviations between root and airfoil)

The maximum acceptable temperature on the 2nd - 4th stage LPT airfoils is 1150°C (ref. Aviall T.I. No. CFM56-009).

CONCLUSIONS:

1. The 2nd and 3rd stage LP turbine blades showed airfoil microstructures of higher than normal operating temperatures (1150 and 1050°C respectively) but had not been overheated per current inspection standards established by CFMI.

2. The 4th stage LPT blades showed no changes in airfoil microstructure.

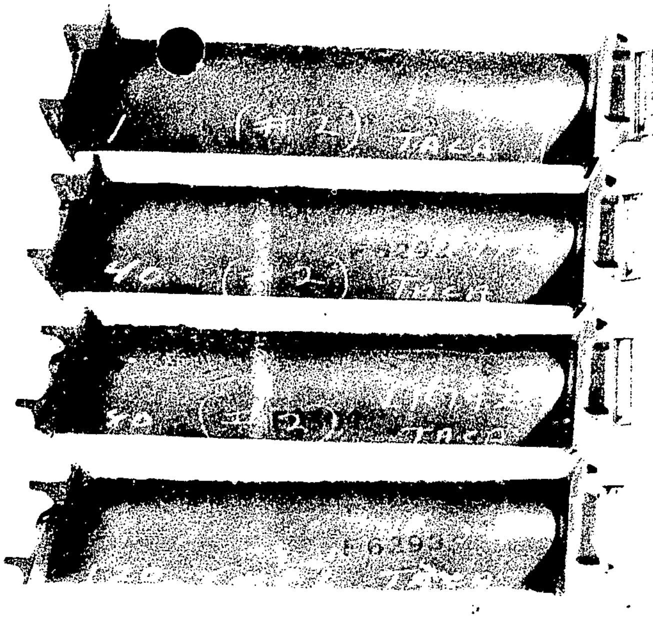

Fig. 1 - 2nd stage blades from engine S/N 721973.

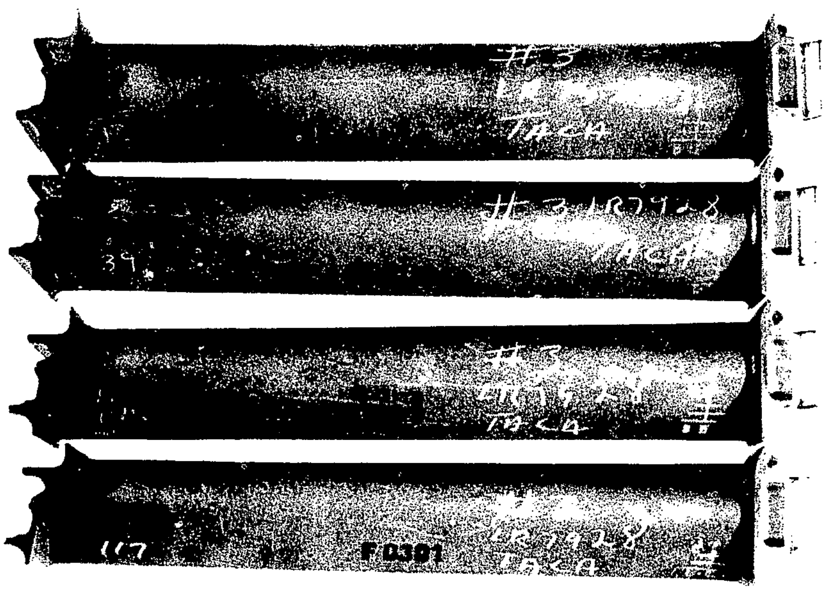

Fig. 2 - 3rd stage blades from engine S/N 721973.

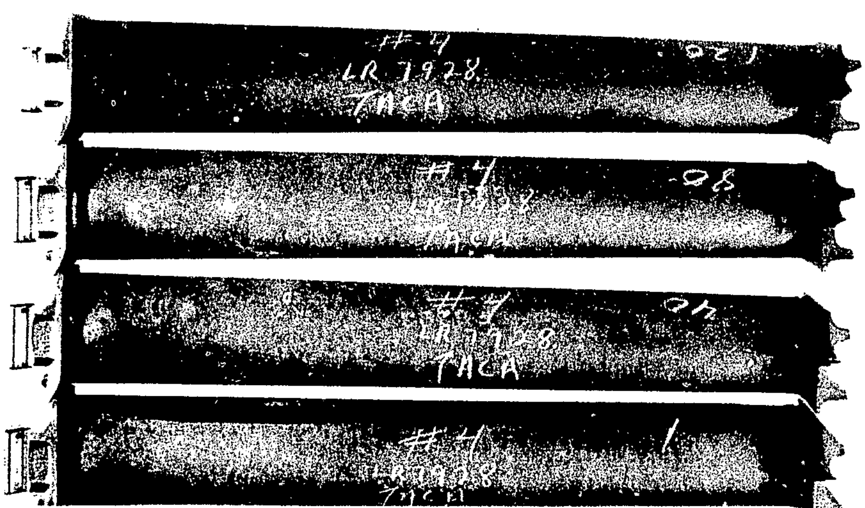

Fig. 3 - 4th stage blades from engine S/N 721973.

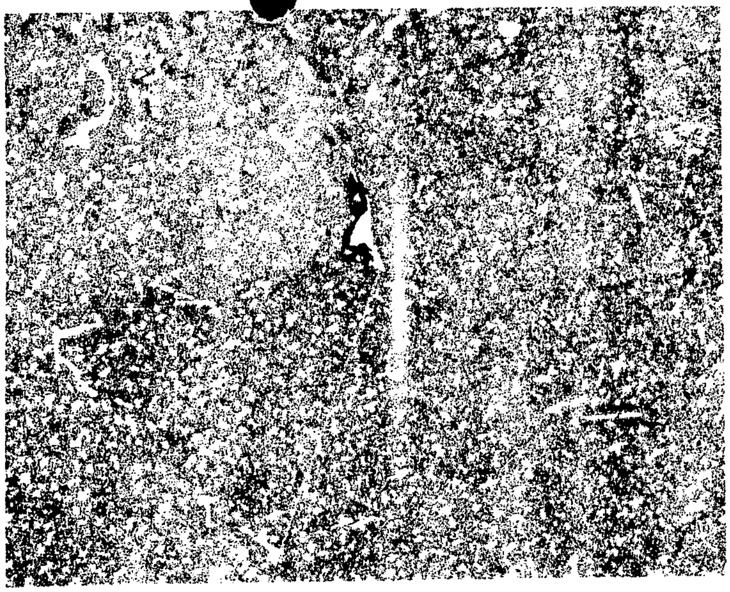

Fig. 4 - Airfoil microstructure of 2nd stage blade #1.

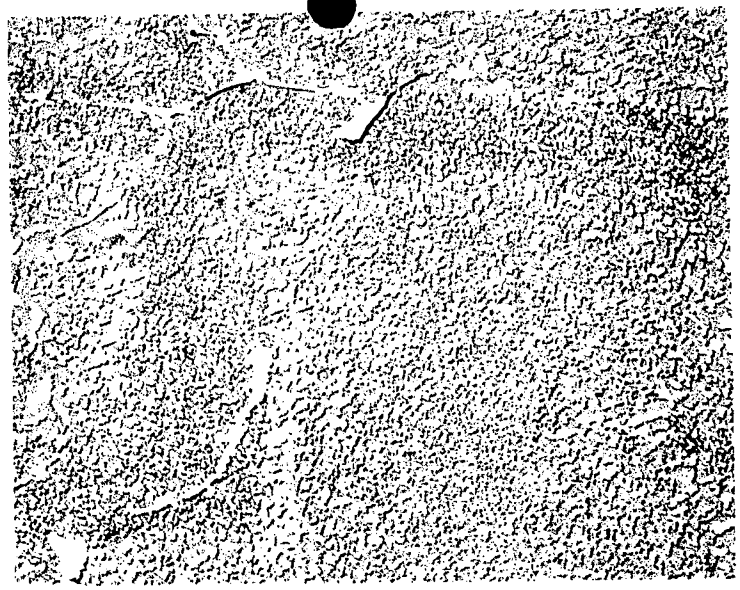

Fig. 5 - Root microstructure of 2nd stage blade #1.

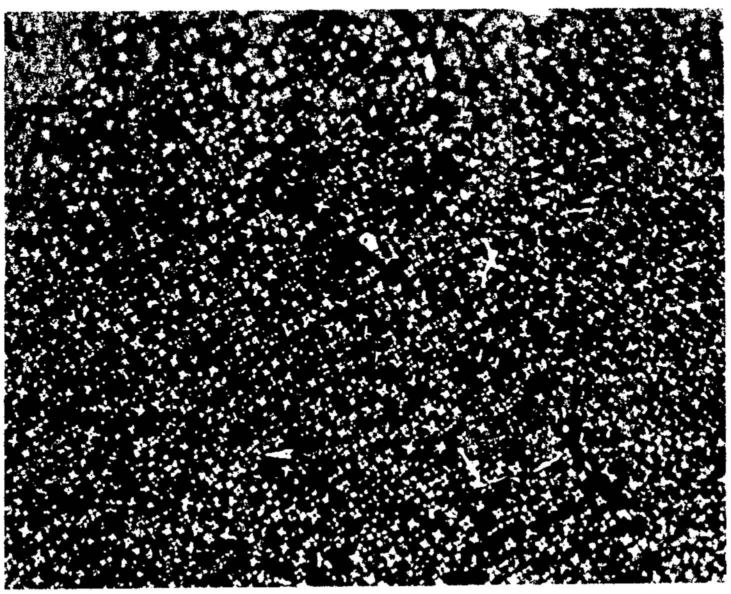

Fig. 6 - Airfoil microstructure of 2nd stage blade #40.

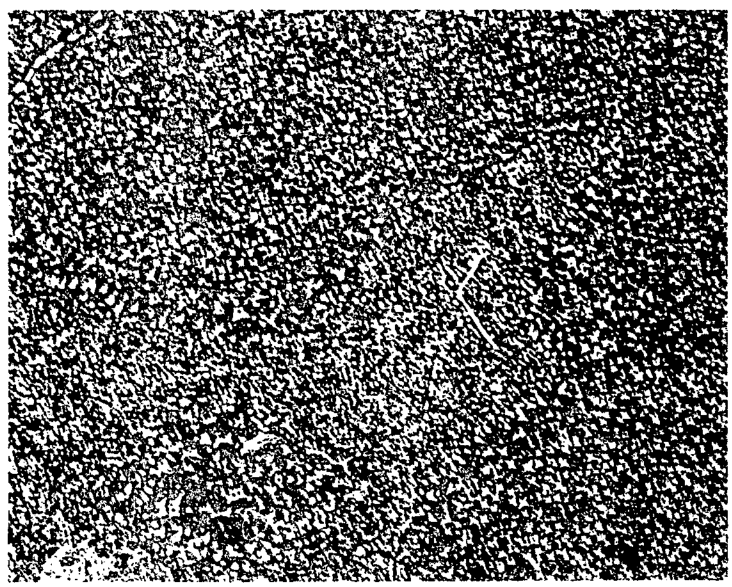

Fig. 7 - Root microstructure of 2nd stage blade #40.

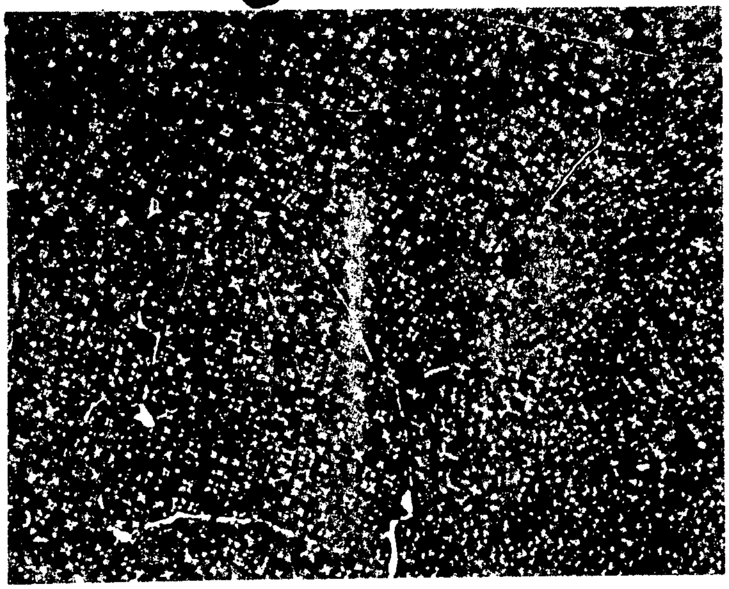

Fig. 8 - Airfoil microstructure of 2nd stage blade #80.

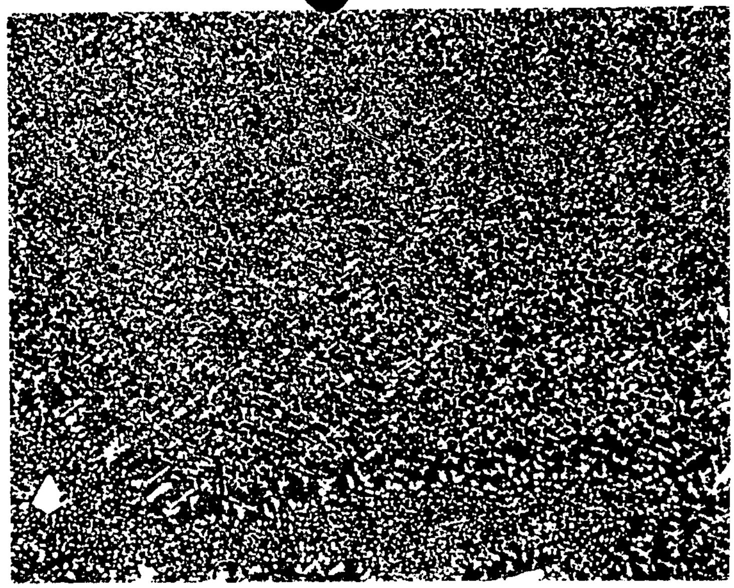

Fig. 9 - Root microstructure of 2nd stage blade #80.

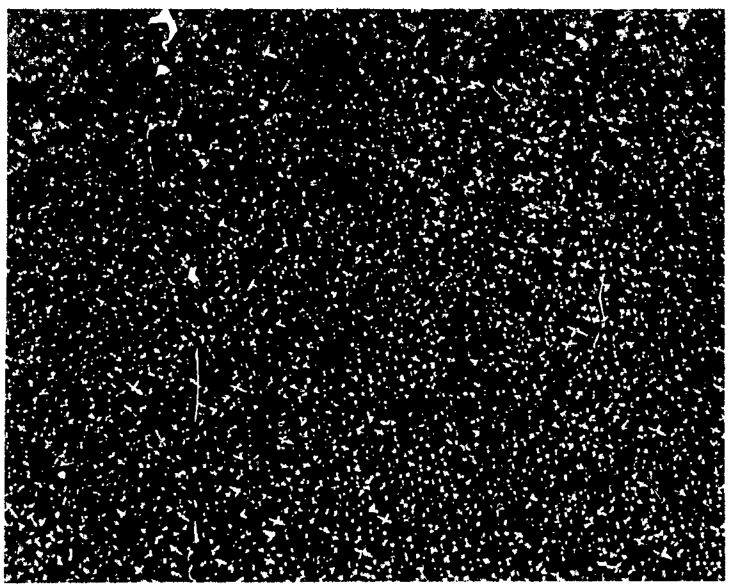

Fig. 10 - Airfoil microstructure of 2nd stage blade #120.

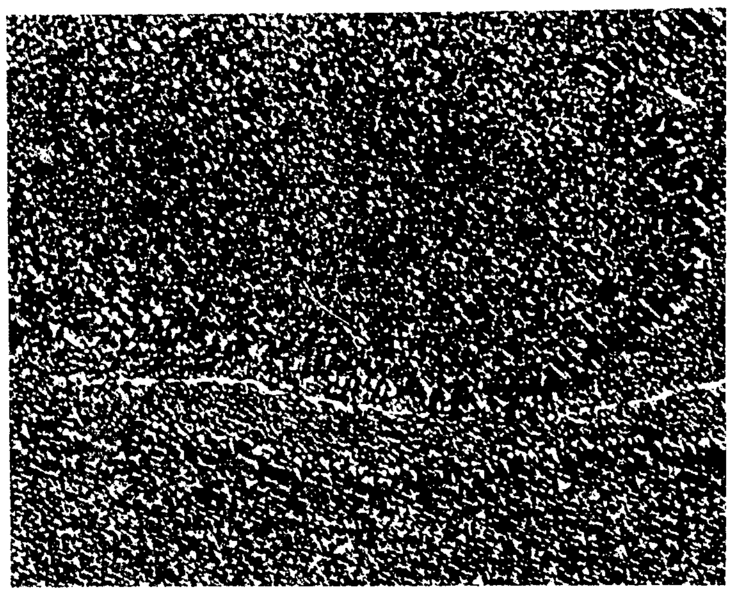

Fig. 11 - Root microstructure of 2nd stage blade #120.

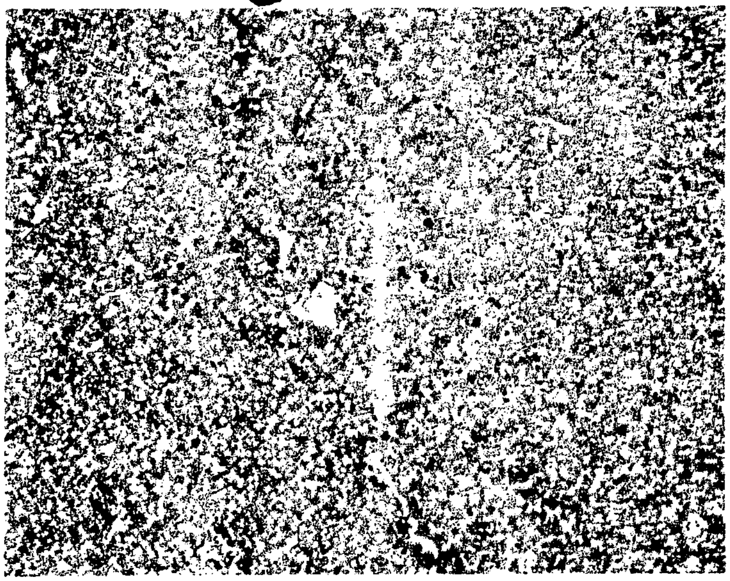

Fig. 12 - Airfoil microstructure of 3rd stage blade #1.

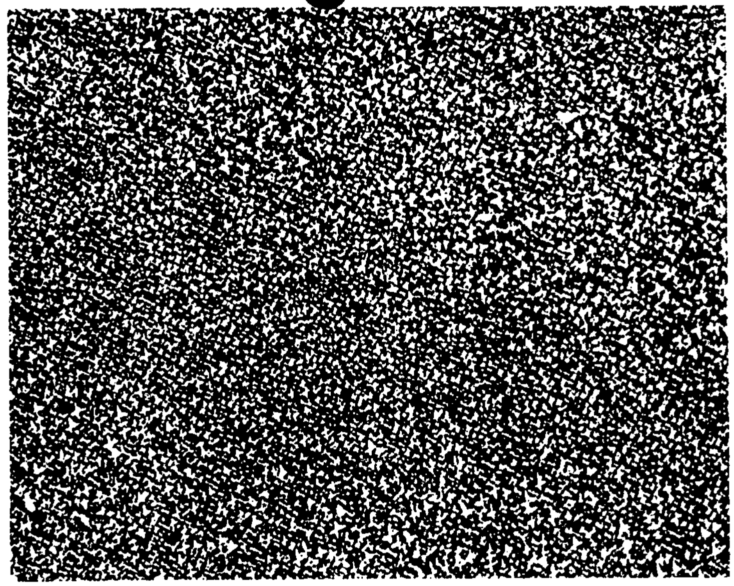

Fig. 13 - Root microstructure of 3rd stage blade #1.

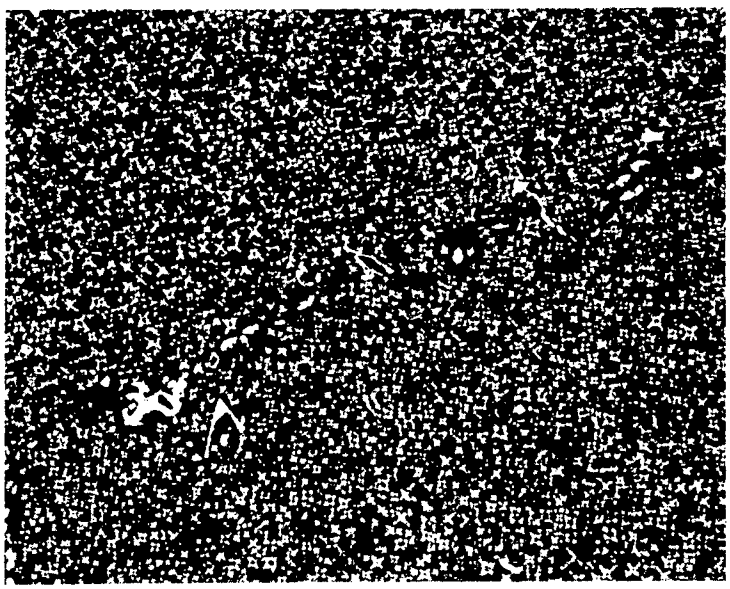

Fig. 14 - Airfoil microstructure of 3rd stage blade #39.

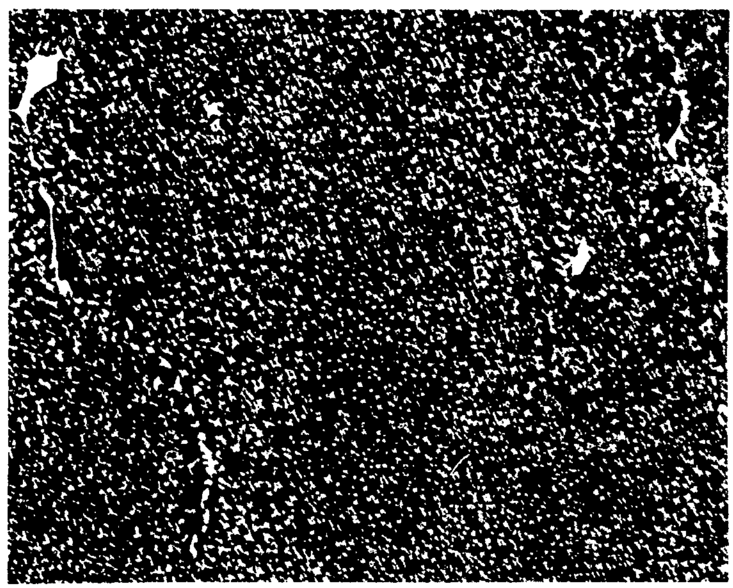

Fig. 15 - Root microstructure of 3rd stage blade #39.

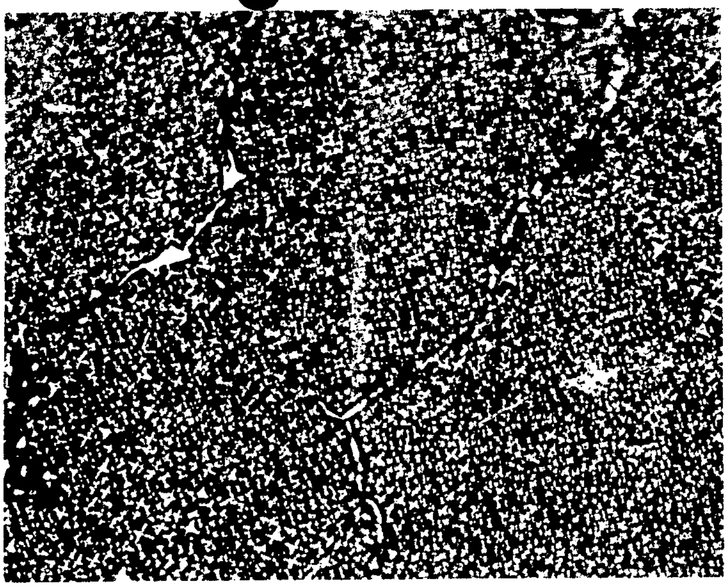

Fig. 16 - Airfoil microstructure of 3rd stage blade #78.

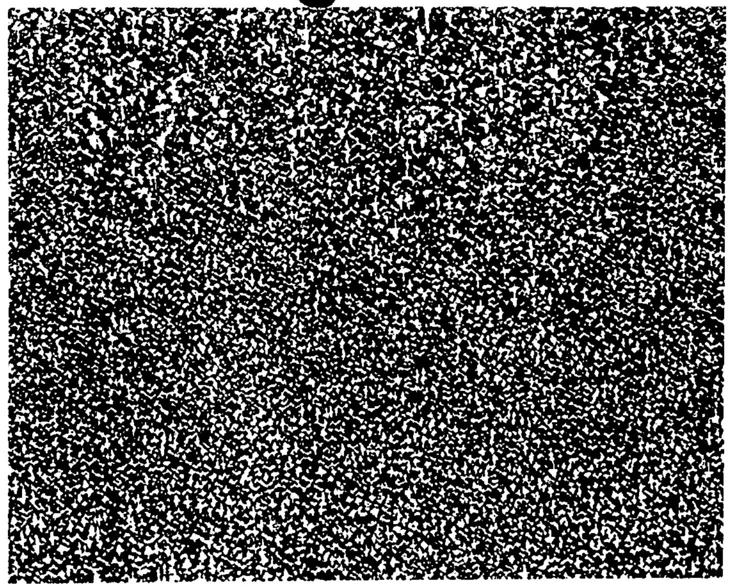

Fig. 17 - Root microstructure of 3rd stage blade #78.

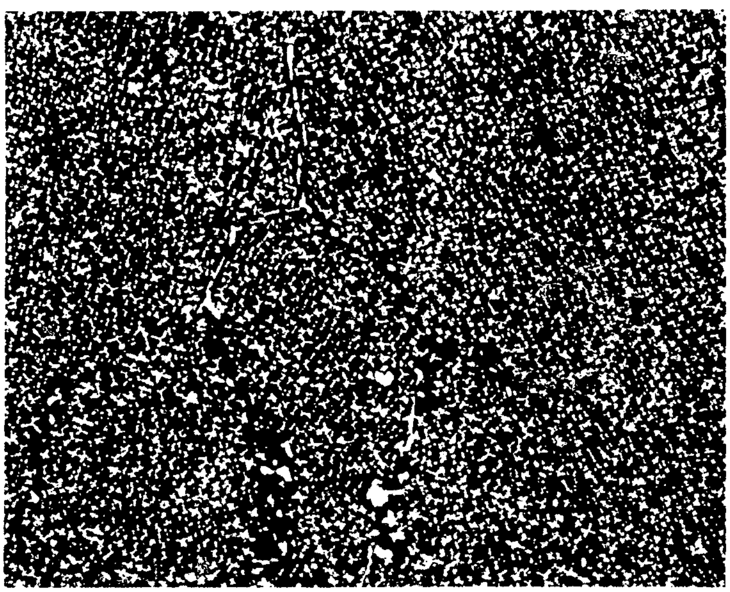

Fig. 18 - Airfoil microstructure of 3rd stage blade #117.

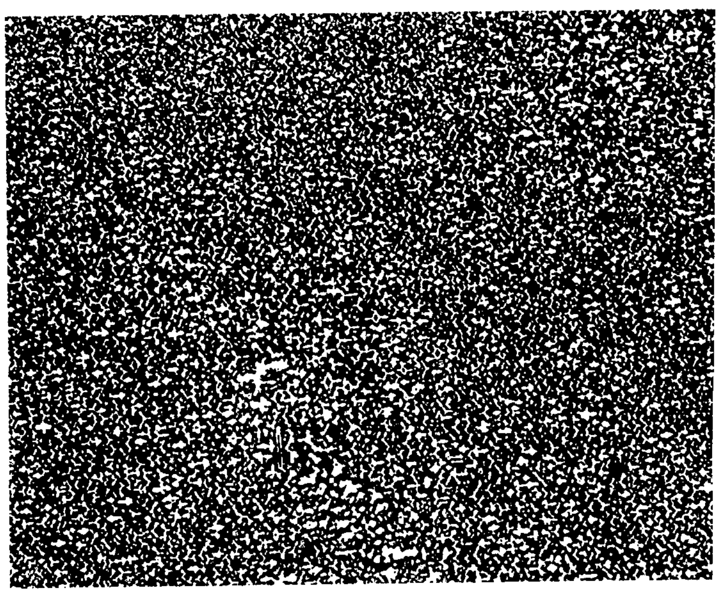

Fig. 19 - Root microstructure of 3rd stage blade #117.

Fuel Analysis Report

LUBRIPORT
LABORATORIES
INC.

MAY 31, 1988

U.S.A. NATIONAL TRANSPORTATION
SAFETY BOARD
FEDERAL BLDG. RM. 7A07
819 TAYLOR STREET
FORT WORTH, TEXAS 76102

ATTN: WARREN WANDEL

MR. WANDEL,

THE BOTTLES OF FUEL SAMPLED FROM TACA FLIGHT 110 WERE DELIVERED FRIDAY, MAY 27, 1988 BY MR. JOHN ABEL. THE SAMPLES WERE ANALYZED, AS REQUESTED, UTILIZING ASTM PROCEDURES FOR JET-A FUEL.

RESULTS OF THE TESTING SHOWS FUEL TO MEET THE SPECIFICATIONS AS REQUIRED OF THIS GRADE FUEL. EXAMINATION OF THIS FUEL YIELDS NO EVIDENCE OF ANY UNDESIRABLE PROPERTIES AND IT CAN BE ASSUMED THAT OTHER TESTING OF FUEL WHICH MIGHT BE PERFORMED WILL VERIFY ITS GOOD QUALITY.

YOURS TRULY,

[redacted]

FLOYD J. FRILOUX, JR.
PRESIDENT

384

LUBRIPORT LABORATORIES INC.

PRODUCT: JET FUEL

SAMPLES MARKED: TACA FLIGHT 110
SEE BELOW

SAMPLE REC'D DATE: 5/29/88

DATE SAMPLE DRAWN: ---

ACCOUNT: U.S.A. NATIONAL TRANSPORTATION
SAFETY BOARD
FEDERAL BLDG. RM. 7A07
819 TAYLOR STREET
FORT WORTH, TEXAS 76102

INVOICE NO. LL-5655

P.O. NO. ---

DATE: MAY 31, 1988

TOTAL CHARGES: $110.00

LAB NO. 5-785 & 5-786

REVIEWED BY [redacted]

SAMPLE MARKED	RIGHT MAIN TANK	LEFT MAIN TANK	SPECIFICATIONS
GRAVITY API @ 60 F (D1298)	42.5	42.5	37-51
TCC FLASH (D56)	117 F	119	100 F MIN
MILLIPORE FILTRATION 0.8 MICRON FILTER (F313)	1.0 MG/L	1.0 MG/L	1.0 MG/L MAX
DISTILLATION IBP F (D86)	319 F	326 F	
10%	358	358	400 F MAX
50%	412	414	
90%	482	484	
END POINT	530	530	572 F MAX
RECOVERY	98.5%	98.5%	
RESIDUE	1.0%	1.0%	1.5% MAX
LOSS	0.5%	0.5%	1.5% MAX
WATER BY KARL FISCHER (D1744)	50-90 PPM *	50-90 PPM *	

MILLIPORE FILTRATION RUN ON 1 LITER OF FUEL

* MOISTURE RUN ON EACH OF FOUR SAMPLES FROM TANKS

1650 AIRLINE HIGHWAY • KENNER, LOUISIANA 70062 • (504) 464-1734

LUBRIPORT LABORATORIES INC.

PRODUCT: JET FUEL

SAMPLES MARKED: TACA FLIGHT 110
SEE BELOW

SAMPLE REC'D DATE: 5/29/88

DATE SAMPLE DRAWN: ---

ACCOUNT: U.S.A. NATIONAL TRANSPORTATION
SAFETY BOARD
FEDERAL BLDG. RM. 7A07
819 TAYLOR STREET
FORT WORTH, TEXAS 76102

INVOICE NO. LL-5655

P.O. NO. ---

DATE: MAY 31, 1988

TOTAL CHARGES: $100.00

LAB NO. 5-787 & 5-788

REVIEWED BY [redacted]

SAMPLE MARKED	RIGHT FILTER DRAIN	LEFT FILTER DRAIN	SPECIFICATIONS
TCC FLASH (D56)	118 F	119 F	100 F MIN
MILLIPORE FILTRATION 0.8 MICRON FILTER (F313)	<1.0 MG/L	1.0 MG/L	1.0 MG/L MAX
DISTILLATION IBP F (D86)	324 F	320 F	
10%	358	356	400 F MAX
50%	416	412	
90%	482	478	
END POINT	532	522	572 F MAX
RECOVERY	99.0%	98.5%	
RESIDUE	1.0%	1.0%	1.5% MAX
LOSS	0	0.5%	1.5% MAX
WATER BY KARL FISCHER (D1744)	60 PPM	60 PPM	

MILLIPORE FILTRATION RUN ON 1 LITER OF FUEL

1650 AIRLINE HIGHWAY • KENNER, LOUISIANA 70062 • (504) 464-1734

Statement of Party Representatives

STATEMENT OF PARTY REPRESENTATIVES

TO NTSB INVESTIGATION

Aircraft Identification:

Registration Number N75356

Make and Model B-737-300

Location New Orleans, LA

Date 5-24-88

The undersigned hereby acknowledge that they are participating in the above-referenced aircraft accident field investigation (including any component tests and teardowns or simulator testing) on behalf of the party indicated adjacent to their name, for the purpose of providing technical assistance to the National Transportation Safety Board.

The undersigned further acknowledge that they have read the attached copy of 49 CFR Part 831 and have familiarized themselves with 49 CFR §831.9, which governs participation in NTSB investigations and agree to abide by the provisions of this regulation.

It is understood that a party representative to an investigation may not be a person who also represents claimants or insurers. The placement of a signature hereon constitutes a representation that participation in this investigation is not on behalf of either claimants or insurers and that, while any information obtained may ultimately be used in litigation, participation is not for the purposes of preparing for litigation.

By placing their signatures hereon all participants agree that they will neither assert nor permit to be asserted on their behalf, any privilege in litigation, with respect to information or documents obtained during the course of and as a result of participation in the NTSB investigation as described above. It is understood, however, that this form is not intended to prevent the undersigned from participating in litigation arising out of the accident referred to above or to require disclosure of the undersigned's communications with counsel.

SIGNATURE	NAME (Printed)	PARTY	DATE
[redacted]	ALFREDO SCHILDKNECHT	TACA	5/27/88
[redacted]	ERNESTO RUIZ	TACA	5/27/88
[redacted]	Jaime Gonzalez	TACA	05/27/88

Continued on reverse

SIGNATURE	NAME (Printed)	PARTY	DATE
[redacted]	Mauricio Machado	Taca International	5/27/88
[redacted]	MAURICIO AVELAR	TACA INT'L Airlines	5-27-88
[redacted]	NOT A PARTY — WDL ~~Paul Campo~~	~~ASOD~~	~~5-27-88~~
[redacted]	RODNEY GRAHAM	BOEING	5-27-88
[redacted]	Juan Carlos Solis R	Taca Intl Airlines	5-27-88
[redacted]	C.M. SCHOONEMAN	BOEING	5-27-88
[redacted]	RICHARD P. ALEY	BOEING	5-27-88
[redacted]	James W. Bruce	CFM International	5/27/88
[redacted]	JEROME P. CLARK	GE ACFT ENGINES	5/27/88

Title 49 - Transportation

CHAPTER VIII–NATIONAL TRANSPORTATION SAFETY BOARD

Effective: June 14, 1979

NATIONAL TRANSPORTATION SAFETY BOARD

PART 831—AIRCRAFT ACCIDENT/INCIDENT INVESTIGATION PROCEDURES

Authority: Title VII, Federal Aviation Act of 1978, as amended, 72 Stat. 781, as amended by 76 Stat. 921 (49 U.S.C. 1441 et seq); and the Independent Safety Board Act of 1974, Pub. L. 93–633, 88 Stat. 2166 et seq. (49 U.S.C. 1901 et seq.).

§ 831.1 Applicability of part.

Unless otherwise specifically ordered by the National Transportation Safety Board (Board), the provisions of this part shall govern all aircraft accident or incident investigations, conducted under the authority of Title VII of the Federal Aviation Act of 1958, as amended, and the Independent Safety Board Act of 1974. Rules applicable to aircraft accident hearings and reports are set forth in Part 845.

§ 831.2 Responsibility of Board.

(a) The Board is responsible for the organization, conduct and control of all accident investigations involving civil aircraft, or civil and military aircraft, within the United States, its territories and possessions. It is also responsible for investigation of accidents which occur outside the United States, and which involve U.S. civil aircraft or civil and military aircraft, at locations determined to be not in the territory of another state (i.e., in international waters).

(b) Certain field investigations are conducted by the Federal Aviation Administration (FAA), pursuant to a request to the Secretary of the Department of Transportation, effective February 10, 1977 (see appendix to Part 800 of this chapter),[1] but the Board determines the probable cause of such accidents. Under no circumstances shall investigations conducted by the Board be considered joint investigations in the sense of sharing responsibility. However, in the case of an accident or incident involving civil aircraft of U.S. registry or manufacture in a foreign state which is a signator to Annex 13 to the Chicago Convention of the International Civil Aviation Organization, the state of occurrence is responsible for the investigation. If it occurs in a foreign state which is not bound by the provisions of Annex 13 to the Chicago Convention, the conduct of the investigation shall be in consonance with any agreement entered into between the United States and the foreign state.

§ 831.3 Authority of Director.

The Director, Bureau of Accident Investigation, subject to the provisions of § 831.2, may order an investigation into any accident or incident involving a civil aircraft.

§ 831.4 Nature of investigation.

Aircraft accident or incident investigations are conducted by the Board in order to determine the facts, conditions, and circumstances relating to each accident or incident and the probable cause thereof and to ascertain measures which will best tend to prevent similar accidents or incidents in the future. The investigation includes the field investigation, report preparation, and, where ordered, the public hearing.

§ 831.5 Request to withhold information.

Any person may make written objection to the public disclosure of information contained in any report or document filed, or of information obtained by the Board, stating the grounds for such objection. The Board, on its own initiative or if such objection is made, may order such information withheld from public disclosure when, in its judgment, the information can be withheld under the provisions of an exemption to the Freedom of Information Act (Pub. L. 93–502, amending 5 U.S.C. 552) and its release is not found to be in the public interest (see Part 801).

§ 831.6 Right of representation.

Any person interrogated by an authorized representative of the Board during the field investigation shall be accorded the right to be accompanied, represented, or advised by counsel or by any other duly qualified representative.

§ 831.7 Investigator-in-charge.

The designated investigator-in-charge organizes, conducts, and controls the field phase of investigation. He shall assume responsibility for the supervision and coordination of all resources and of the activities of all personnel, both Board and non-Board, involved in the onsite investigation.

§ 831.8 Authority of Board representatives.

Upon demand of an authorized representative of the Board and presentation of credentials issued to such representative, any Government agency, air carrier, airman, or person engaged in air commerce or in any phase of aeronautics, and any other person having possession or control of any aircraft, aircraft engine, propeller, appliance, air navigation facility, equipment or any pertinent records and memoranda, including all documents, papers, and correspondence now or hereafter existing and kept or required to be kept, shall forthwith permit inspection, photographing, or copying thereof by such authorized representative for the purpose of investigating an aircraft accident, overdue aircraft, study, or investigation pertaining to safety in air navigation or the prevention of accidents. Authorized representatives of the Board may interrogate any person having knowledge relevant to an aircraft accident/incident, overdue aircraft, study, or special investigation.

[1] The authority of a representative of the Federal Aviation Administration during such field investigations shall be the same as that of a Board investigator under this part.

§ 831.9 Parties to the field investigation.

(a) The investigator-in-charge may, on behalf of the Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations, designate parties to participate in the field investigation. Parties to the field investigation shall be limited to those persons, government agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident or incident and who can provide suitable qualified technical personnel to actively assist in the field investigation.

(b) Participants in the field investigation shall be responsive to the direction of the appropriate Board representative and may be relieved from participation if they do not comply with their assigned duties or if they conduct themselves in a manner prejudicial to the investigation.

(c) No party to the field investigation designated under § 831.9(a) shall be represented by any person who also represents claimants or insurers. Failure to comply with this provision shall result in loss of status as a party.

(d) Section 701(g) of the Federal Aviation Act of 1958, as amended, provides for the appropriate participation of the Administrator in Board investigations. Thus, the FAA will normally be a party to field investigations and will have the same rights and privileges and be subject to the same limitations as other parties.

§ 831.10 Access to and release of aircraft wreckage, records, mail, and cargo.

(a) Only the Board's accident investigation personnel and persons authorized by the investigator-in-charge, the Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations to participate in any particular investigation, examination or testing shall be permitted access to aircraft wreckage, records, mail, or cargo which is in the Board's custody.

(b) Aircraft wreckage, records, mail, and cargo in the Board's custody shall be released by an authorized representative of the Board when it is determined that the Board has no further need of such wreckage, mail, cargo, or records.

§ 831.11 Flow and dissemination of accident information.

(a) Release of information during the field investigation, particularly at the accident scene, shall be limited to factual developments, and shall be made only through the Board Member present at the accident scene, the representative of the Board's Office of Public Affairs, or the investigator-in-charge.

(b) All information concerning the accident or incident obtained by any personnel participating in the field investigation shall be passed to the investigator-in-charge, through appropriate channels. Upon approval of the investigator-in-charge, parties to the investigation may relay to their respective organization information which is necessary for purposes of prevention or remedial action. Under no circumstances shall accident information be released to, or discussed with, unauthorized persons whose knowledge thereof might adversely affect the investigation.

§ 831.12 Proposed findings.

Any person, Government agency, company, or association whose employees, functions, activities, or products were involved in an accident under investigation may submit to the Board, prior to its determination of probable cause, proposed findings to be drawn from the evidence produced during the course of the accident investigation, a proposed probable cause, and proposed safety recommendations designed to prevent future accidents.

Approved by the National Transportation Safety Board on June 5, 1979.

James B. King,

Chairman.

[FR Doc. 79-18577 Filed 6-13-79; 8:45 am]

GPO 909-828

Opns Grp.

STATEMENT OF PARTY REPRESENTATIVES

TO NTSB INVESTIGATION

Aircraft Identification:

Registration Number N75356

Make and Model Boeing 737-300

Location New Orleans, LA

Date 5-24-88

The undersigned hereby acknowledge that they are participating in the above-referenced aircraft accident field investigation (including any component tests and teardowns or simulator testing) on behalf of the party indicated adjacent to their name, for the purpose of providing technical assistance to the National Transportation Safety Board.

The undersigned further acknowledge that they have read the attached copy of 49 CFR Part 831 and have familiarized themselves with 49 CFR §831.9, which governs participation in NTSB investigations and agree to abide by the provisions of this regulation.

It is understood that a party representative to an investigation may not be a person who also represents claimants or insurers. The placement of a signature hereon constitutes a representation that participation in this investigation is not on behalf of either claimants or insurers and that, while any information obtained may ultimately be used in litigation, participation is not for the purposes of preparing for litigation.

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SIGNATURE	NAME (Printed)	PARTY	DATE
[redacted]	Jeffrey L. Gorney	NTSB OPS. Gr. Chairman	6-15-88
[redacted]	Andrew Mihalchik	GE Flight Ops Engineering	6-15-88
[redacted]	C.M. Schjoneman	Boeing	6-15-88

Continued on reverse

SIGNATURE	NAME (Printed)	PARTY	DATE
[redacted]	NAT D. POTTER	FAA [redacted]	615-88
[redacted]	TERENCE H. KRIHA	[redacted] BOEING FLIGHT TEST	6-15-88
[redacted]	DONALD P. SCOTT	TACA [redacted]	6/15/88
MANUEL E. ALCAINE	[redacted]	TACA [redacted]	6-15-88.

Title 49 - Transportation

CHAPTER VIII–NATIONAL TRANSPORTATION SAFETY BOARD

Effective: June 14, 1979

NATIONAL TRANSPORTATION SAFETY BOARD

PART 831—AIRCRAFT ACCIDENT/INCIDENT INVESTIGATION PROCEDURES

Authority: Title VII, Federal Aviation Act of 1978, as amended, 72 Stat. 781, as amended by 76 Stat. 921 (49 U.S.C. 1441 et seq); and the Independent Safety Board Act of 1974, Pub. L. 93–633, 88 Stat. 2166 et seq. (49 U.S.C. 1901 et seq.).

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[1] The authority of a representative of the Federal Aviation Administration during such field investigations shall be the same as that of a Board investigator under this part.

§ 831.6 Right of representation.

Any person interrogated by an authorized representative of the Board during the field investigation shall be accorded the right to be accompanied, represented, or advised by counsel or by any other duly qualified representative.

§ 831.7 Investigator-in-charge.

The designated investigator-in-charge organizes, conducts, and controls the field phase of investigation. He shall assume responsibility for the supervision and coordination of all resources and of the activities of all personnel, both Board and non-Board, involved in the onsite investigation.

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§ 831.9 Parties to the field investigation.

(a) The investigator-in-charge may, on behalf of the Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations, designate parties to participate in the field investigation. Parties to the field investigation shall be limited to those persons, government agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident or incident and who can provide suitable qualified technical personnel to actively assist in the field investigation.

(b) Participants in the field investigation shall be responsive to the direction of the appropriate Board representative and may be relieved from participation if they do not comply with their assigned duties or if they conduct themselves in a manner prejudicial to the investigation.

(c) No party to the field investigation designated under § 831.9(a) shall be represented by any person who also represents claimants or insurers. Failure to comply with this provision shall result in loss of status as a party.

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§ 831.12 Proposed findings.

Any person, Government agency, company, or association whose employees, functions, activities, or products were involved in an accident under investigation may submit to the Board, prior to its determination of probable cause, proposed findings to be drawn from the evidence produced during the course of the accident investigation, a proposed probable cause, and proposed safety recommendations designed to prevent future accidents.

Approved by the National Transportation Safety Board on June 5, 1979.

James B. King,

Chairman.

[FR Doc. 79-18577 Filed 6-13-79; 8:45 am]

GPO 909-826

399

Release of Aircraft Wreckage, NTSB Form 6120.15

NATIONAL TRANSPORTATION SAFETY BOARD

RELEASE OF AIRCRAFT WRECKAGE

ACCIDENT IDENTIFICATION NUMBER: FTW-88-M-A109

PART I—RELEASE OF AIRCRAFT WRECKAGE

REGISTERED OWNER (name and address) TACA International Airlines P.O. Box 20047 New Orleans, LA 70141	REGISTRATION NUMBER—N N75356
	MAKE Boeing

MODEL	DATE OF ACCIDENT	LOCATION
737-300	05-24-88	New Orleans

The National Transportation Safety Board has ☐ has not ☒ completed its investigation of the aircraft wreckage described above. All wreckage except that listed on the reverse side is hereby released to the registered owner, or owner's representative, for appropriate disposition. (If no parts are retained, insert NONE.)

see reverse

SIGNATURE OF NTSB REPRESENTATIVE	TITLE	DATE
[redacted] Warren V. Wandel	Air Safety Investigator	06/04/88

(This section may be signed by a person, not the owner or owner's representative, who has knowledge of the disposition of the aircraft wreckage and its parts. Such signature does not place a responsibility for disposition of the wreckage upon that person.)

I HEREBY ACKNOWLEDGE:

☒ Receipt of the above described aircraft wreckage.

☒ Removal of the parts, if any, listed on the reverse side of this form.

SIGNATURE	TITLE	DATE
[redacted]	U.S. OPERATIONS MGR.	6/3/88

REMARKS:

Aircraft is released solely for the purpose of moving it from the NASA Michoud Assembly Facility to the New Orleans International Airport. The NTSB assumes no responsibility for the movement.

NTSB FORM 6120.15 (Rev. 5/79)

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NATIONAL TRANSPORTATION SAFETY BOARD RECEIPT OF AIRCRAFT PARTS	ACCIDENT IDENTIFICATION NUMBER FTW-88-M-A109

PART II—RELEASE OF AIRCRAFT PARTS

REGISTRATION NUMBER	MAKE	MODEL
N75356	Booing	732-300

DATE OF ACCIDENT	LOCATION
05/24/88	New Orleans, LA

The National Transportation Safety Board has retained, for further examination, those parts, pieces, or components listed below. When the examination is complete, they will be returned to:

OWNER OR OWNER'S REPRESENTATIVE— TACA International Airlines
ADDRESS P. O. Box 20047 A.M.F.
New Orleans, LA 70141

PARTS, PIECES, OR COMPONENTS RETAINED:

2 Fuel Filters
1 Flight Data Recorder
1 Cockpit Voice Recorder

SIGNATURE OF NTSB REPRESENTATIVE	TITLE	DATE
[redacted] Warren V. Wandel	Air Safety Investigator	06/04/88

The registered owner or owner's representative will acknowledge receipt of the materials by signing this form in the spaces designated below.

SIGNATURE OF OWNER OR OWNER'S REPRESENTATIVE ADDRESS	TITLE	DATE

40.

NATIONAL TRANSPORTATION SAFETY BOARD RELEASE OF AIRCRAFT WRECKAGE	ACCIDENT IDENTIFICATION NUMBER FTW-88-N-A109

PART I—RELEASE OF AIRCRAFT WRECKAGE

REGISTERED OWNER (name and address)		REGISTRATION NUMBER—N
TACA International Airlines P. O. Box 20047, A.M.F. New Orleans, Louisiana 70141		N75356
		MAKE Boeing
MODEL 737-300	DATE OF ACCIDENT 5-24-88	LOCATION New Orleans, LA

The National Transportation Safety Board has ☐ has not ☒ completed its investigation of the aircraft wreckage described above. All wreckage except that listed on the reverse side is hereby released to the registered owner, or owner's representative, for appropriate disposition. (If no parts are retained, insert NONE.)

See attached correspondence

SIGNATURE OF NTSB REPRESENTATIVE	TITLE	DATE
[redacted] Warren V. Wandel	Air Safety Investigator	8-25-88

(This section may be signed by a person, not the owner or owner's representative, who has knowledge of the disposition of the aircraft wreckage and its parts. Such signature does not place a responsibility for disposition of the wreckage upon that person.)

I HEREBY ACKNOWLEDGE:

☒ Receipt of the above described aircraft wreckage.

☒ Removal of the parts, if any, listed on the reverse side of this form.

SIGNATURE	TITLE	DATE
X [redacted] Capt. Donald P. Scott	Manager, U.S. Operations	8/29/88

REMARKS:

Retained components are listed in the attached correspondence. Engine serial number 721-973 is located at the facilities of Aviall in Dallas, Texas.

NTSB FORM 6120.15 (Rev. 5/79)

NATIONAL TRANSPORTATION SAFETY BOARD RECEIPT OF AIRCRAFT PARTS	ACCIDENT IDENTIFICATION NUMBER

PART II—RELEASE OF AIRCRAFT PARTS

REGISTRATION NUMBER	MAKE	MODEL

DATE OF ACCIDENT	LOCATION

The National Transportation Safety Board has retained, for further examination, those parts, pieces, or components listed below. When the examination is complete, they will be returned to:

OWNER OR OWNER'S REPRESENTATIVE—

ADDRESS

PARTS, PIECES, OR COMPONENTS RETAINED:

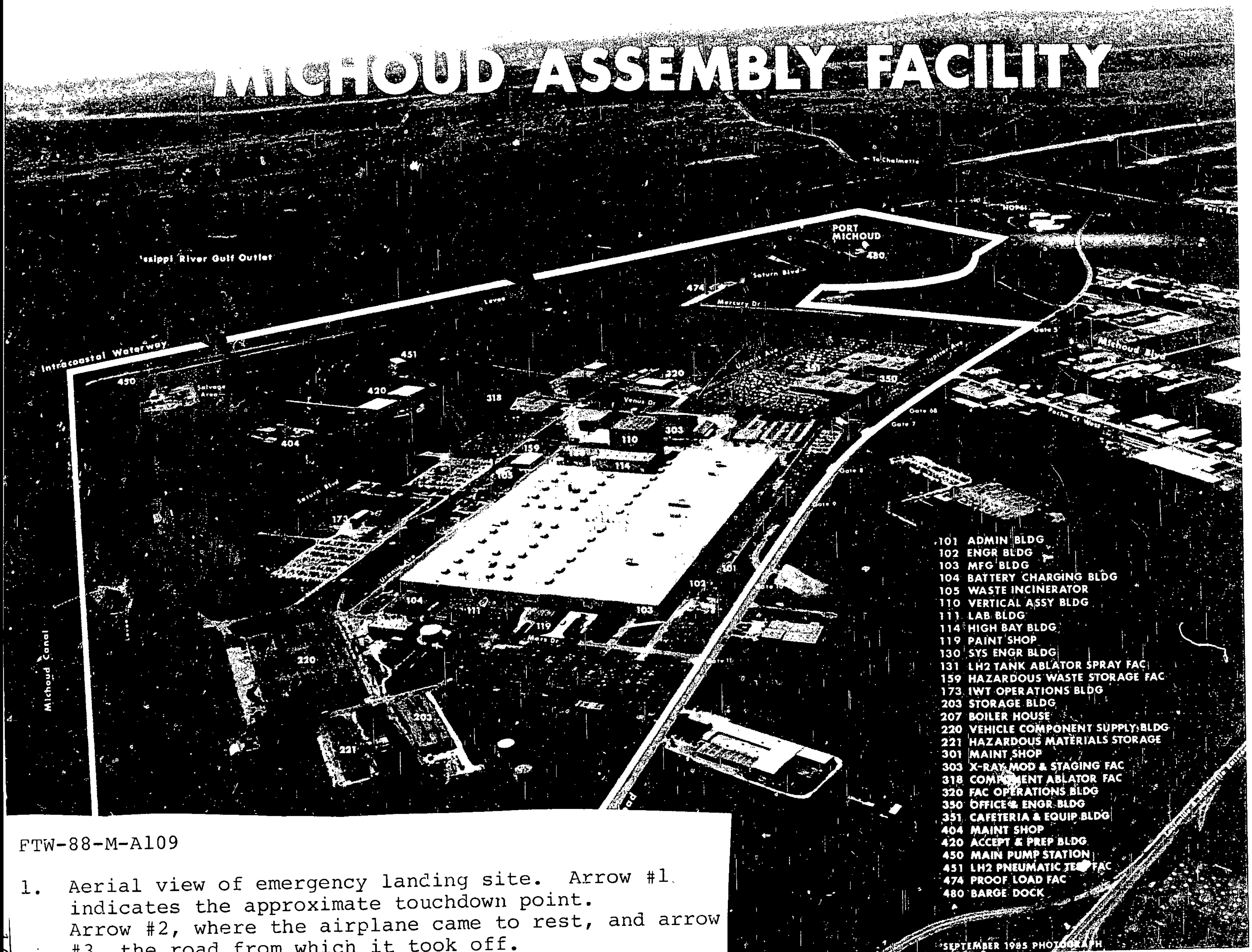
SIGNATURE OF NTSB REPRESENTATIVE	TITLE	DATE

The registered owner or owner's representative will acknowledge receipt of the materials by signing this form in the spaces designated below.

SIGNATURE OF OWNER OR OWNER'S REPRESENTATIVE ADDRESS	TITLE	DATE

403

Photos



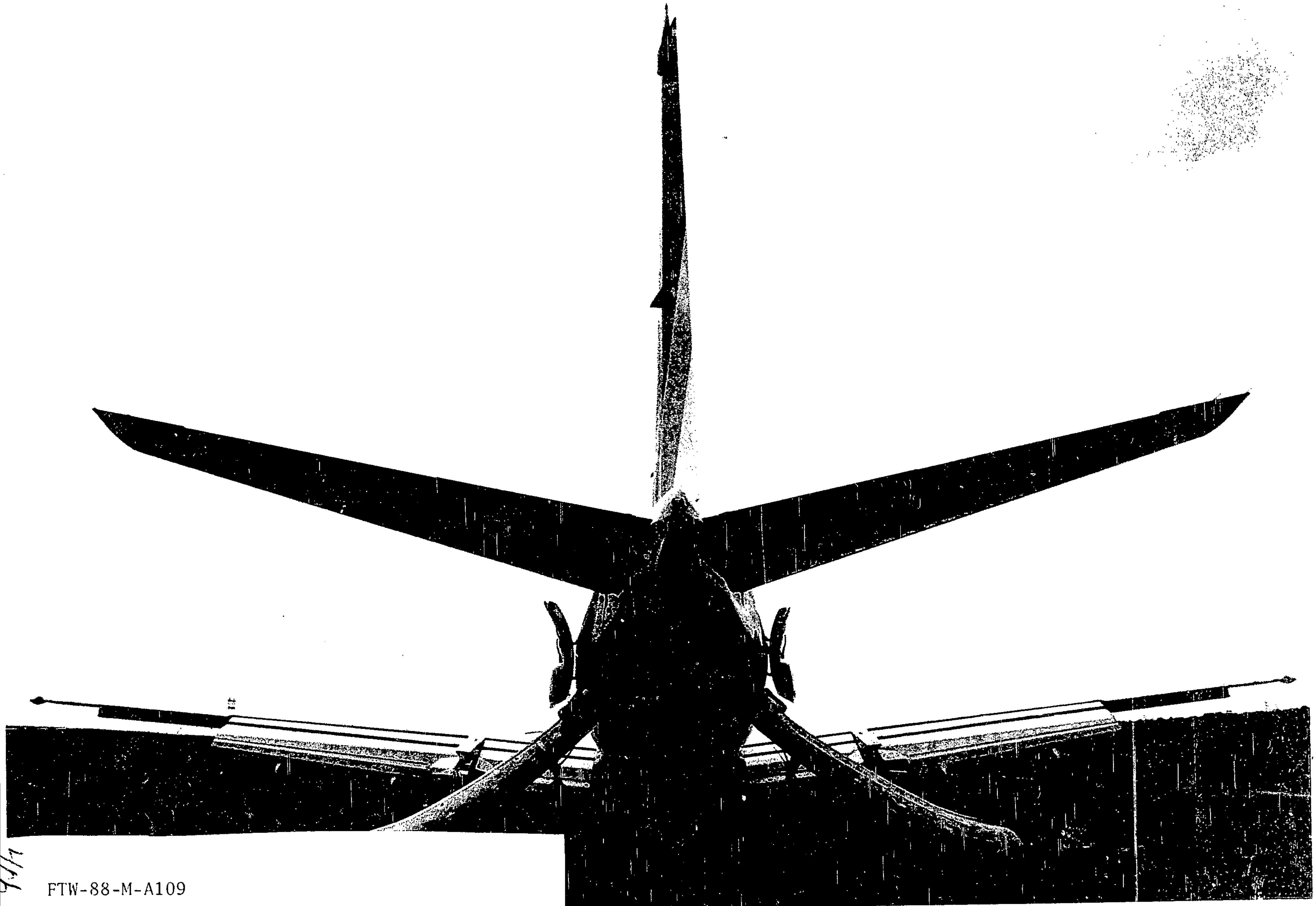
FTW-88-M-A109

1. Aerial view of emergency landing site. Arrow #1 indicates the approximate touchdown point. Arrow #2, where the airplane came to rest, and arrow #3, the road from which it took off.

FTW-88-M-A109

2. View of airplane as it came to rest. Note dissipating thunderstorms in the background. NASA photograph, negatives are not available for photos 1, 2, and 3.

4/05

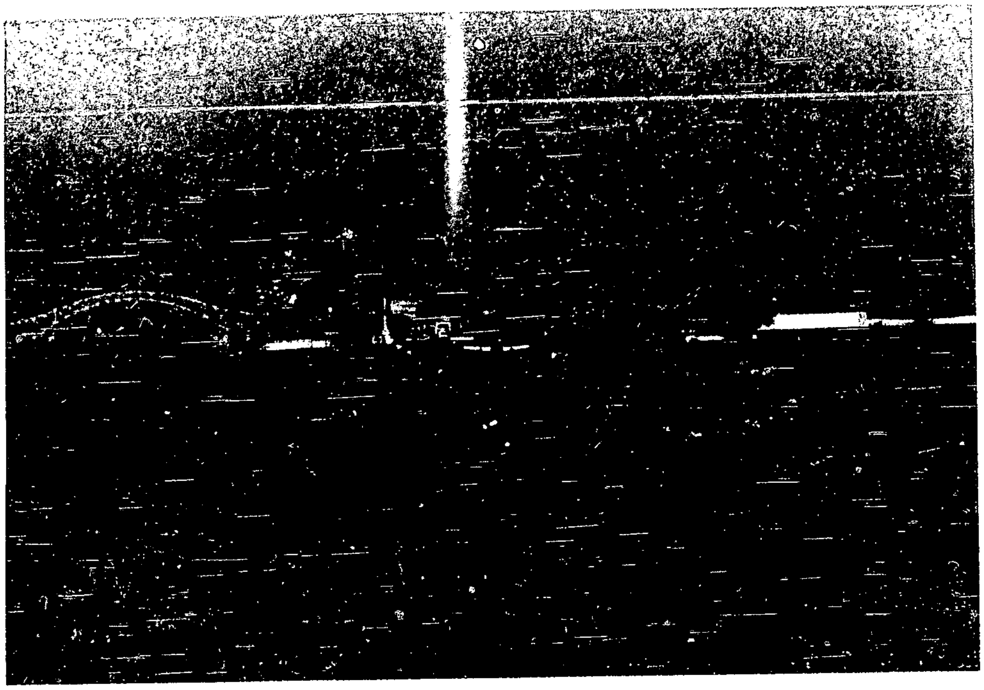


4/6

FTW-88-M-A109

3. Airplane as seen form the rear. Note canal on right side and levee on left side.

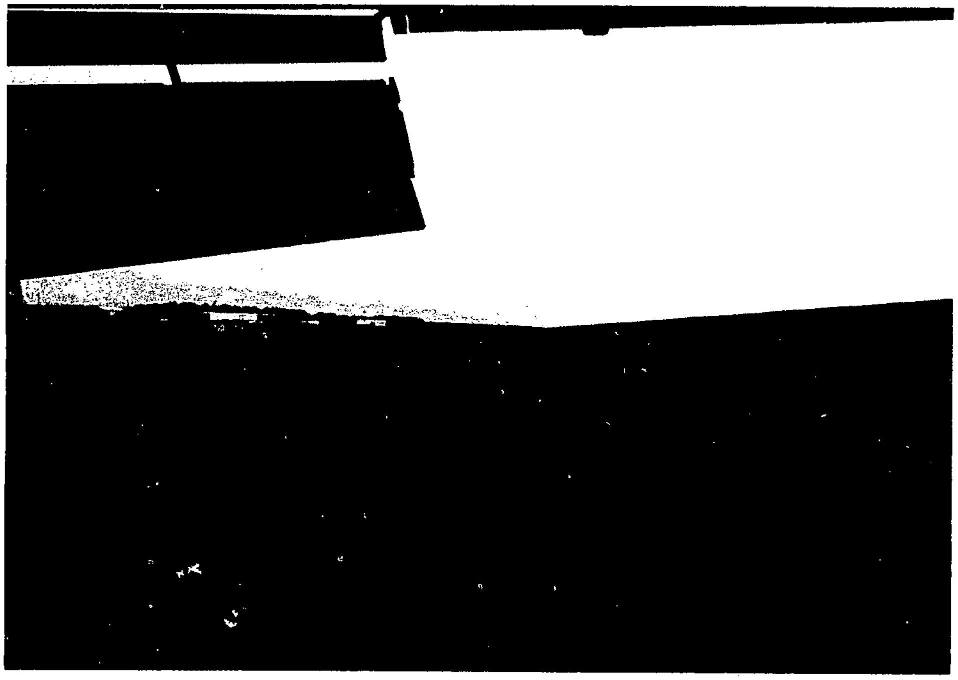
FTW-88-M-A109



4. View of landing site as seen from top of levee adjacent to the approximate point of touchdown.

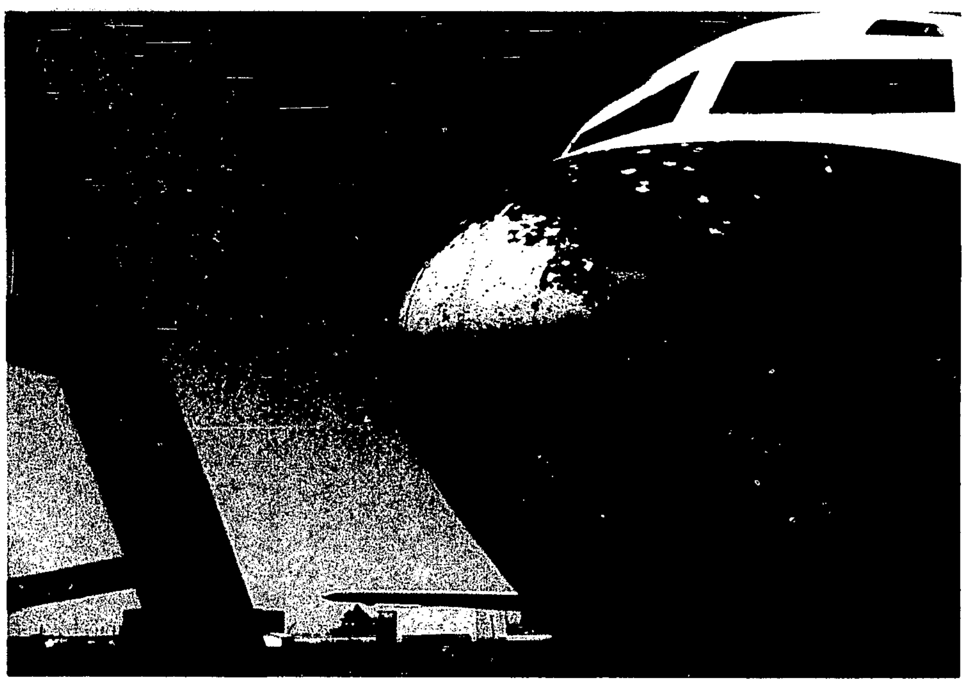
5. View from airplane looking in the direction of landing.

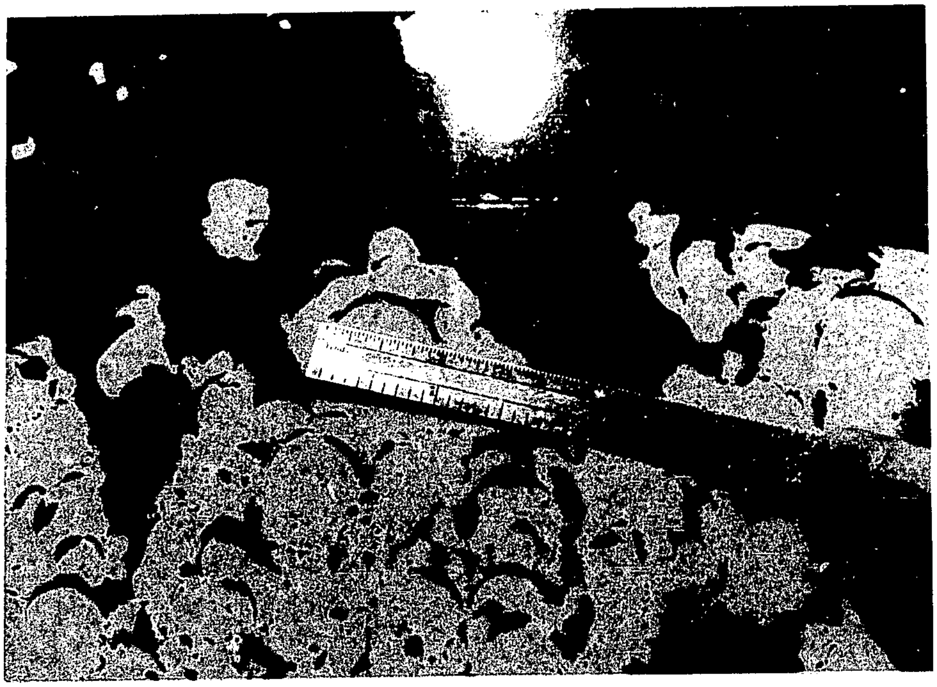
FTW-88-M-A109



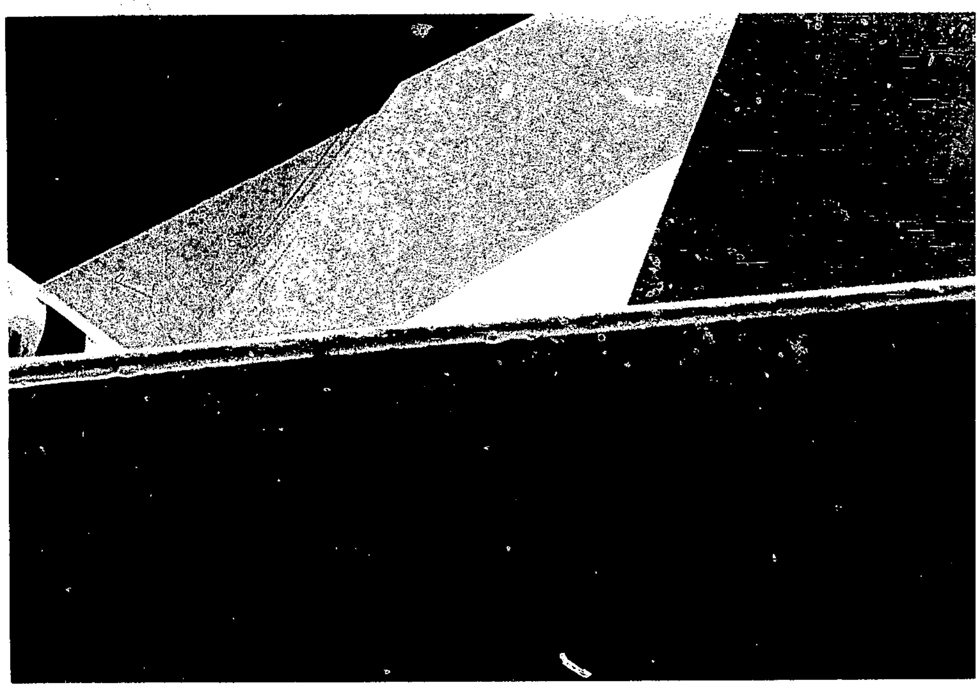
6. View from airplane looking back toward touchdown area.

7. Radome and nose paint were heavily damage by hail.



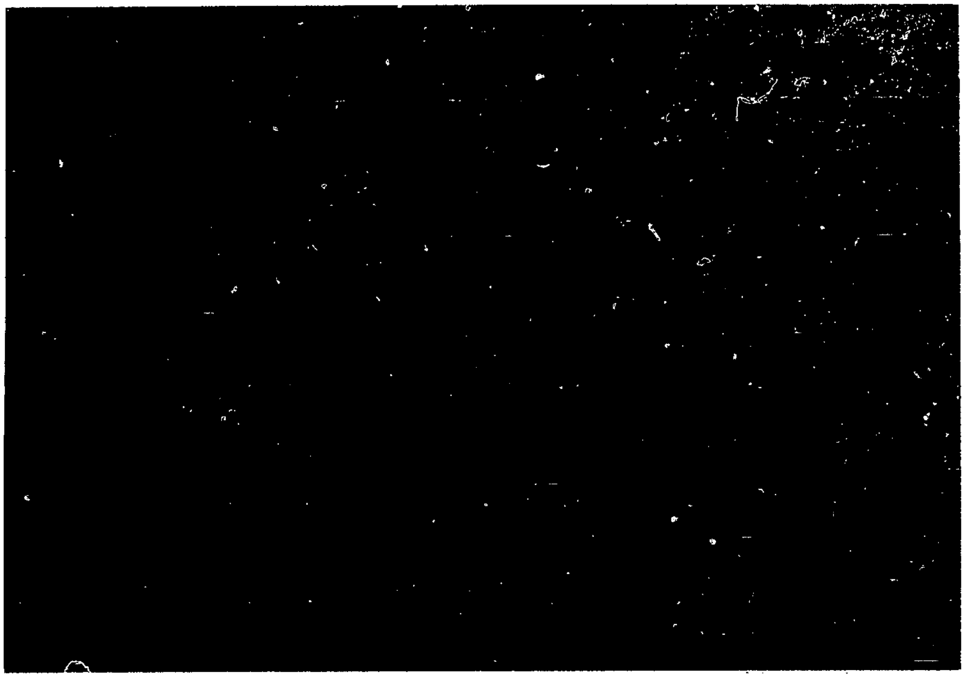


8. Scars made by hail stones measured up to 1.25 inches across.



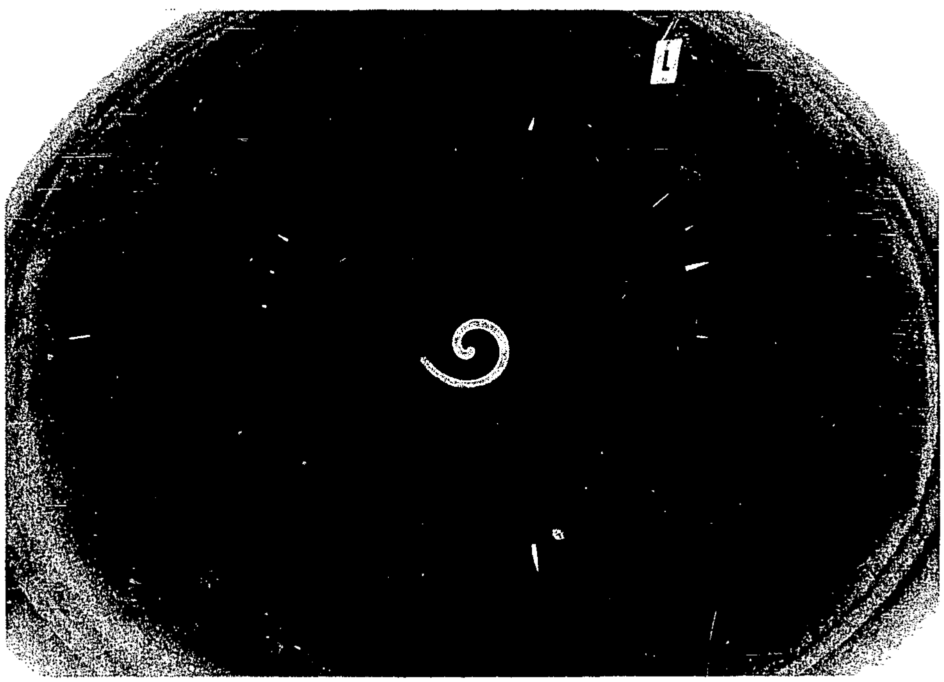
9. Leading edges of horizontal stabilizers were also hail damaged.

FTW-88-M-A109

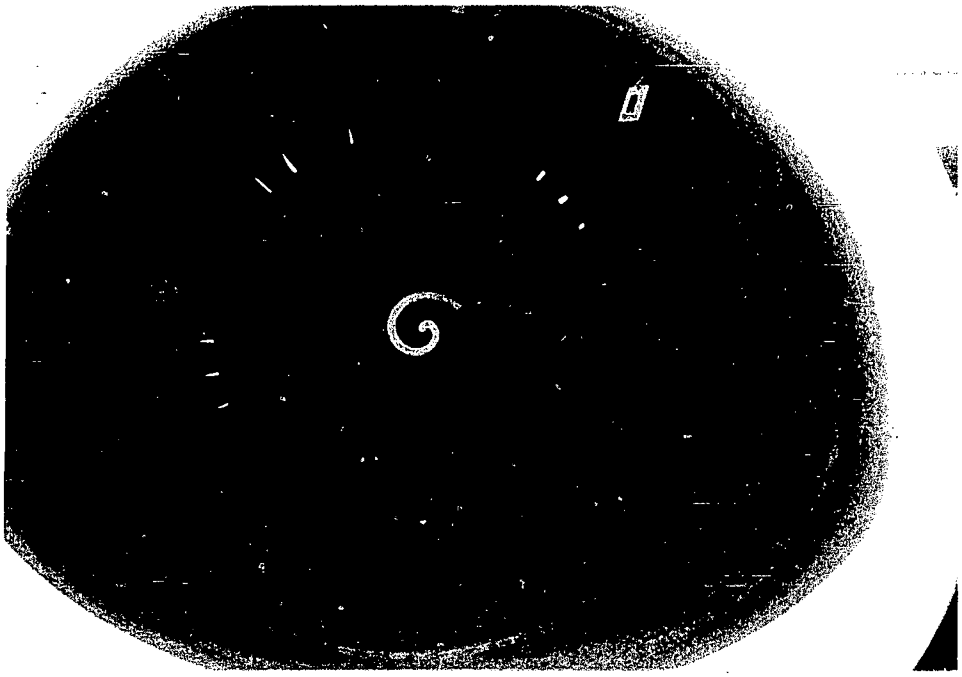


10. Wing fuel gauges and drip sticks indicated a total of about 12,800 pounds of fuel on board at touchdown.

11. Left engine fan disc did not exhibit evidence of any damage.

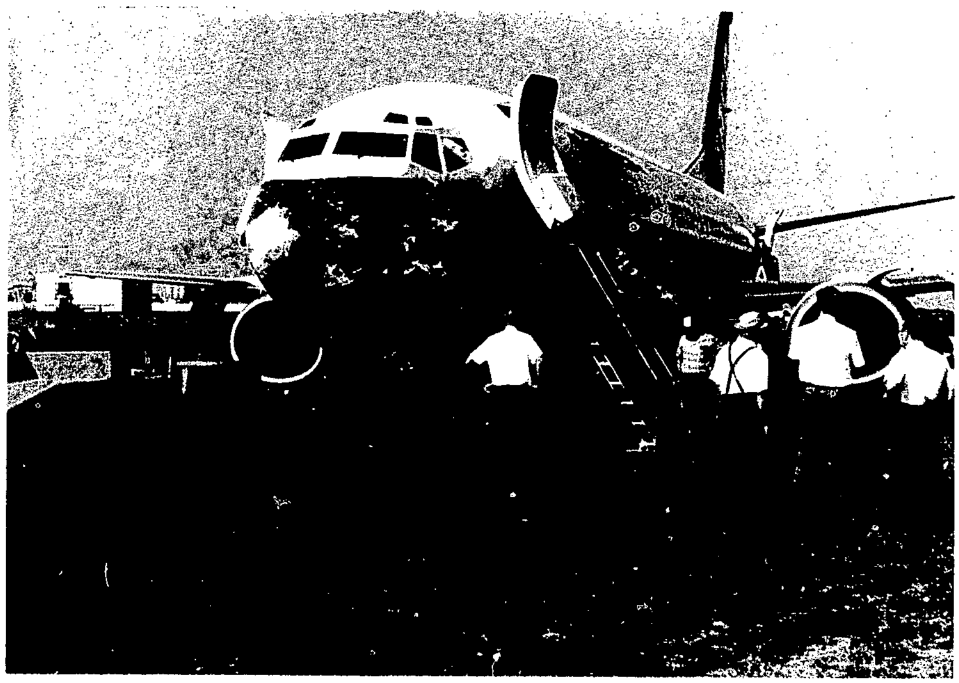


FTW-88-M-A109



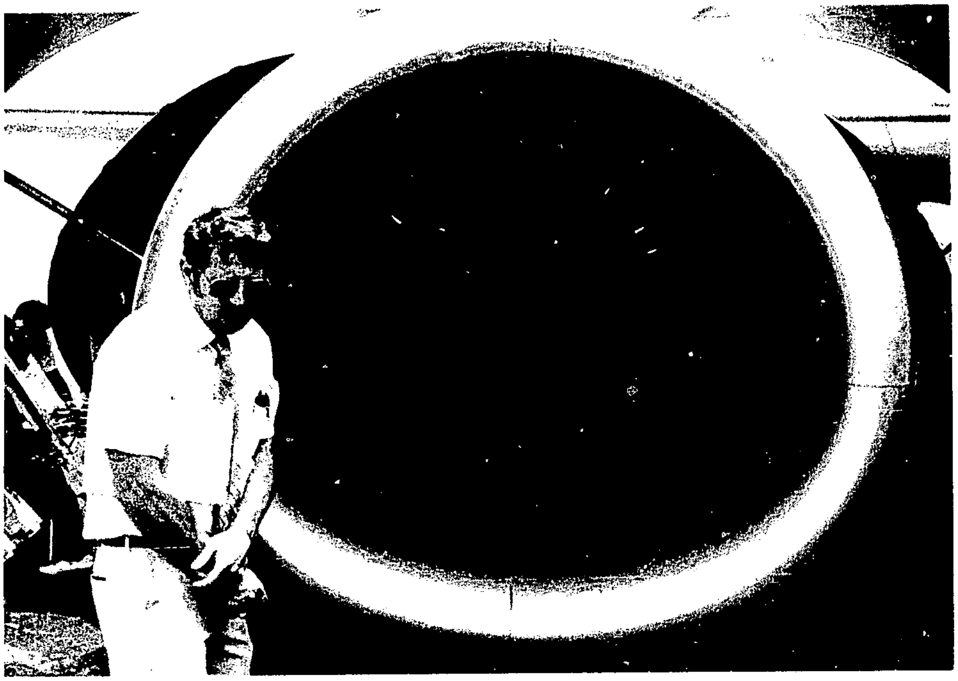
12. Right engine fan disc was not damaged.

13. Engines and airframe systems were examined prior to moving the airplane.



411

FTW-88-M-A109



14. Due to internal thermal damage, a locked rotor start and idle check was performed an the #5 engine.

412

Dispatch Documents

TACA INTERNATIONAL AIRLINES

INTERNATIONAL AIRLINES

LOADSHEET, LOADMESSAGE, BALANCE AND TRIM SHEET

BOEING 737-3TO

COPY

4/3

LOADSHEET AND LOADMESSAGE

ADDRESS	FLIGHT NO.	A/C REG.	A/C TYPE	BAL.CHART NO.	CAPTAIN	CREW	FROM	TO	DATE
MSY	110	N75356	737-300			7	BLZ	MSY	24/5/88

	WEIGHT (POUNDS)	INDEX
BASIC EMPTY WEIGHT	71665	
CREW ( ) ±	1040	
GALLEYS FWD / AFT ±	218	43.0
DRY OPERATING WEIGHT	72923	
TAKE-OFF FUEL +	24000	
OPERATING WEIGHT	96923	

PRE-TAKE-OFF WEIGHT CHECK

	ZERO FUEL	TAKE-OFF	LANDING
MAXIMUM WEIGHT ALLOWED FOR	106500		114000
TAKE-OFF FUEL (TOTAL FUEL MINUS TAXI, RUN-UP FUEL) +	23500	TRIP FUEL +	12000
ALLOWED WEIGHT FOR TAKE-OFF (LOWEST OF 1,2,3)	130000	120500	126000
OPERATING WEIGHT -		96923	
ALLOWED TRAFFIC LOAD =		23577	

DEST	ADULTS	CH	INF	NR	CABIN BAGS		TOTAL	FWD 1	FWD 2	AFT 3	AFT 4	B	C	M	REMARKS
M	19					TR	1657	345	1112			19	2	0	
	18					B	735			735					
TOTALS	37					T	2392								

CABIN BAGS +	
PASSENGER WEIGHT +	6200
TOTAL TRAFFIC LOAD =	8592
DRY OPERATING WEIGHT +	72923
ZERO FUEL WEIGHT	81515
TOTAL FUEL LOAD +	24000
TAXI WEIGHT	105515
TAXI AND RUN-UP FUEL -	500
TAKE-OFF WEIGHT	105015
TRIP FUEL -	12000
LANDING WEIGHT	93015

ADJUSTMENTS

ALL WEIGHTS IN POUNDS

ALLOWED TRAFFIC LOAD	23577
TOTAL TRAFFIC LOAD -	8592
UNDERLOADED	14985

LAST MINUTE CHANGES

DEST	SPECIFICATION	CMPT	WEIGHT	±	INDEX
			37		

LAST MINUTE CHANGES TOTAL

INDEX UNITS = WEIGHT (LB) X (ARM - 648.5) / 65,000

ADD 40 TO DRY OPERATING INDEX OR INDEX SCALE REFERENCE. ADD 400 UNITS

PREPARED BY | APPROVED BY CAPTAIN

SEATING CONDITIONS

CMPT A 12

CMPT B 36

CMPT C 2

BALANCE CONDITIONS

ZFW 17.0 % MAC

TOW 15.0 % MAC

WIND 190/10

RWY 07 1' 15' TEMP 30°C

ELEV

FLAP SETTING FOR T.O. 5

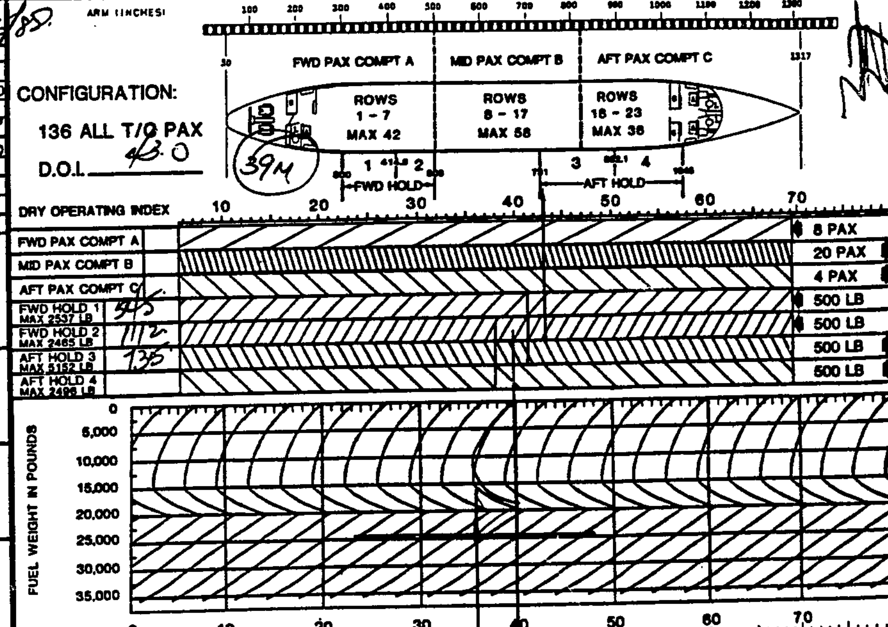
STAB TRIM FOR T.O. 5.1

CONFIGURATION:

136 ALL T/O PAX

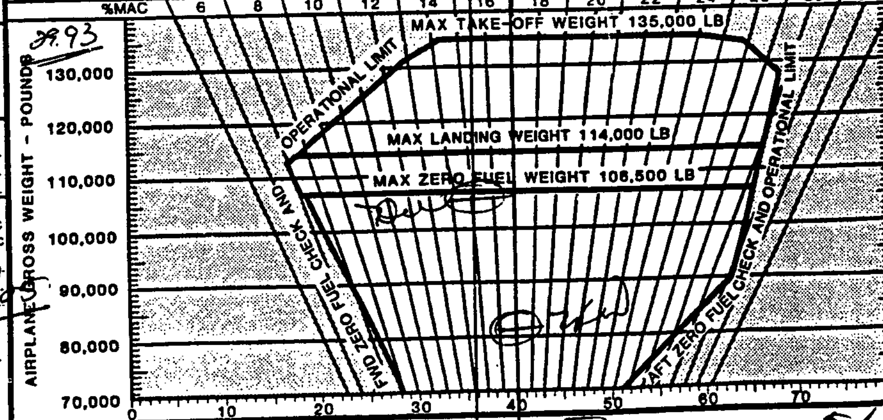
D.O.I. 43.0

39M



FWD HOLD 1: 345 | FWD HOLD 2: 1112 | AFT HOLD 3: 735

STAB TRIM FOR TAKE-OFF (FLAPS)														
1° & 5°	6 ¼	6	5 ¾	5 ½	5 ¼	5	4 ¾	4 ½	4 ¼	4	3 ¾	3 ¼	3	
15°	5 ¾	5 ¼	5	4 ¾	4 ½	4	3 ¾	3 ¼	3	2 ¾	2 ½	2	1 ¾	
%MAC	6	8	10	12	14	16	18	20	22	24	26	28	30	



NOR. N1 92.8 RED. N1 91.1 ARD. N1 ____ V_1 131 V_R 133 V_2 139 FLAP 5 STAB TRIM 5.1

BOEING D6-38404

APR '88

20A

TTL = 18

TACA INTERNATIONAL AIRLINES

LOADSHEET, LOADMESSAGE, BALANCE AND TRIM SHEET

BOEING 737-3TO

LOADSHEET AND LOADMESSAGE

ADDRESS	FLIGHT NO.	A/C REG.	A/C TYPE	BAL.CHART NO.	CAPTAIN	CREW	FROM	TO	DATE
SAL	110	N70356	B-737		DARDANO	8	SAL	BZE	MAYO-24/85

	WEIGHT (POUNDS)	INDEX
BASIC EMPTY WEIGHT	71665	47.1
CREW (8) ±	340	
	1040	
GALLEYS FWD / AFT ±	218	
DRY OPERATING WEIGHT	73263	
TAKE-OFF FUEL +	17500	
OPERATING WEIGHT	90763	

PRE-TAKE-OFF WEIGHT CHECK

	ZERO FUEL	TAKE-OFF	LANDING
MAXIMUM WEIGHT ALLOWED FOR	106500		114000
TAKE-OFF FUEL (TOTAL FUEL MINUS TAXI, RUN-UP FUEL) +	17500	TRIP FUEL +	5550
ALLOWED WEIGHT FOR TAKE-OFF (LOWEST OF 1,2,3)	124000	135000	119550
OPERATING WEIGHT -			90763
ALLOWED TRAFFIC LOAD =			28787

DEST	ADULTS	CH	INF	NR	CABIN BAGS		TOTAL	FWD 1	FWD 2	AFT 3	AFT 4	B	C	M	REMARKS
BZE						TR				850			15		
						B									
						C									
						M									TW
						T									
MSY	7	0	0	0		TR		110	693			3	15		
	2	0	0	0		B		40	419			2	21		
	9	0	0	0		C		395				4			
						T									TW
						T		545	1112	850					Assumed Temp. 58°
TOTALS	18	0	0	0		T	2507								

	WEIGHT
CABIN BAGS +	
PASSENGER WEIGHT +	2790
TOTAL TRAFFIC LOAD =	5297
DRY OPERATING WEIGHT +	73263
ZERO FUEL WEIGHT (MAX 106500)	78560
TOTAL FUEL LOAD +	18000
TAXI WEIGHT (MAX 119550)	96560
TAXI AND RUN-UP FUEL -	500
TAKE-OFF WEIGHT (MAX 119050)	96060
TRIP FUEL -	5550
LANDING WEIGHT (MAX 114000)	90510

ADJUSTMENTS

ALL WEIGHTS IN POUNDS

ALLOWED TRAFFIC LOAD	28787
TOTAL TRAFFIC LOAD -	5297
UNDERLOADED =	23490

LAST MINUTE CHANGES

DEST	SPECIFICATION	CMPT	±	WEIGHT	±	INDEX

LAST MINUTE CHANGES TOTAL

INDEX UNITS = (WEIGHT (LB) × (ARM - 648.5)) / 65,000 FOR DRY OPERATING INDEX OR INDEX SCALE REFERENCE. ADD + 40 UNITS.

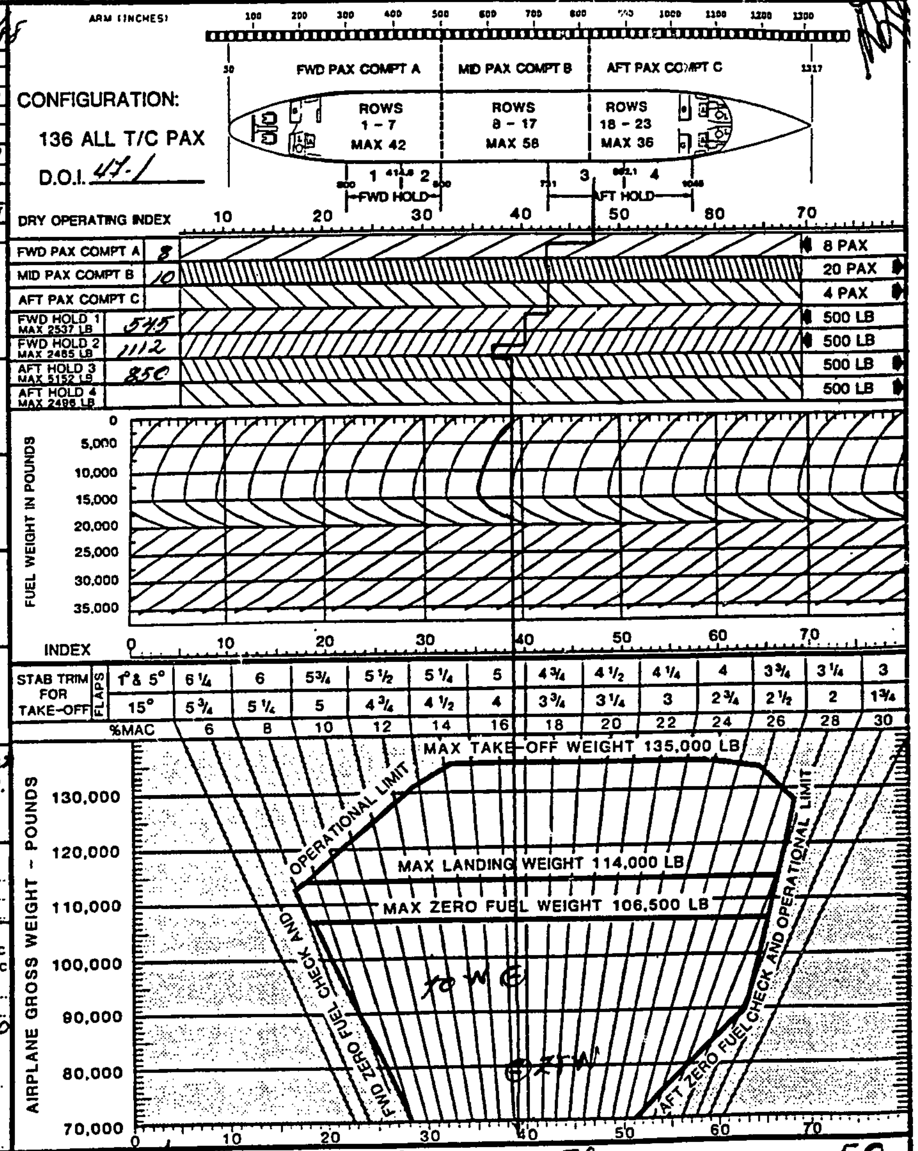
PREPARED BY — APPROVED BY — CAPTAIN

SEATING CONDITIONS
CMPT A 8
CMPT B 10
CMPT C

BALANCE CONDITIONS
ZFW 16.4 % MAC
TOW 16.4 % MAC
WIND 010/06
RWY 25
ELEV 101 TEMP 32/20
FLAP SETTING FOR T.O. 5°
STAB TRIM FOR T.O. 5.0

CONFIGURATION: 136 ALL T/C PAX

D.O.I. 47.1



NOR. N1 92.8 RED. N1 89.0 GO ARD. N1 92.8 V_1 123 V_R 124 V_2 129 FLAP 5° STAB TRIM 5.0

BOEING D6-38404

APR '88

414

TACA INTERNATIONAL, S.A.

FL ________ **B-737** STATION BZE

Cfm-56-3B1/ JT8D

NORMAL			REDUCED
EPR 2 —	EPR —	A/C —	
N1 928	N1 91.1	CRUC. —	

	NORMAL	REDUCED	P.M.D.
V_1	131		RWY ____
V_R	133		RWY ____
			RWY ____
V_2	139		RWY ____

5
FLAPS

5.1
STAB TRIM

ZFW 81575 T.O FUEL 24000 T.O. GWT 105015

TEMP 30 QNH 29.93 P.A. 150/10 CG 15

AR ________ PAX 37 DATE 24/5/88

Form. 1851 I.T.O. 20B.100H.7/87

TPH 110 — N75356

415

TACA INTERNATIONAL AIRLINES S.A.

TACA INTERNATIONAL AIRLINES

FLIGHT PLAN - PLAN DE VUELO

REPUBLICA DE EL SALVADOR, C. A.

FLIGHT PLAN
PLAN DE VUELO

PRIORITY / Prioridad: <<≡ FF →

ADDRESSEE(S) / Destinatario(s): MHTGZQZX MH ZZTZX <<≡

FILING TIME / Hora de deposito: 241215 → ORIGINATOR / Remitente: MSLPZPZX <<≡

SPECIFIC IDENTIFICATION OF ADDRESSEE(S) AND/OR ORIGINATOR
Identificación exacta del (de los) destinatario(s) y/o del remitente

3 MESSAGE TYPE / Tipo de mensaje: <<≡ (FPL

7 AIRCRAFT IDENTIFICATION / Identificación aeronave: — TAI-110

8 FLIGHT RULES / Reglas de vuelo: — I

TYPE OF FLIGHT / Tipo de vuelo: S <<≡

9 NUMBER / Número: —

TYPE OF AIRCRAFT / Tipo de aeronave: B737

WAKE TURBULENCE CAT. / Cat. de estela turbulenta: / M

10 EQUIPMENT / Equipo: — S/S/C <<≡

13 DEPARTURE AERODROME / Aerodromo de salida: — MSLP

TIME / Hora: 1500 <<≡

15 CRUISING SPEED / Velocidad de crucero: — K0430

LEVEL / Nivel: F270

ROUTE / Ruta: → YSV UB-764 BZE.

<<≡

16 DESTINATION AERODROME / Aeródromo de destino: — MZBZ

TOTAL EET / EET Total: HR. MIN 0045

ALTN AERODROME / Aeródromo alt: → MSLP

2ND. ALTN AERODROME / 2º aeródromo alt.: → <<≡

18 OTHER INFORMATION / otros datos: —

REG N75356) <<≡

SERVICIO DE INFORMACION AERONAUTICA (A I S) CEPA — AEROPUERTO DE EL SALVADOR, S.A.

24 MAYO 1988

SUPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN FPL MESSAGES)
Información suplementaria (En los mensajes FPL no hay que transmitir estos datos)

19 ENDURANCE / Autonomía: — E/ HR. MIN 0300

PERSONS ON BOARD / Personas a bordo: → P/ 029

EMERGENCY RADIO / Equipo radio de emergencia: → R/ UHF U, VHF V, ELBA E

SURVIVAL EQUIPMENT / Equipo de supervivencia: → S / POLAR Polar P, DESERT Desertido D, MARITIME Marítimo M, JUNGLE Selva J

JACKETS / Chalecos: → J / LIGHT Luz L, FLUORES Fluor F, UHF U, VHF V

DINGHEIS / Botes neumaticos: — D/ NUMBER Número 04 → CAPACITY Capacidad 236 → COVER Cubierta C → COLOUR Color AMARILLAS <<≡

AIRCRAFT COLOUR AND MARKINGS / Color y marcas de la aeronave: A/ AZUL BLANCO ROJO AMARILLO

REMARKS / Observaciones: — N/ <<≡

PILOT-IN COMMAND / Piloto al mando: C/ [redacted] CARLOS DARDANO) <<≡

FILED BY / Presentado por: A. Henriquez

SPACE RESERVED FOR ADDITIONAL REQUIREMENTS
Espacio reservado para requisitos adicionales

MAYO 24/88

COMISION EJECUTIVA PORTUARIA AUTONOMA

AEROPUERTO INTERNACIONAL EL SALVADOR

SERVICIO DE INFORMACION AERONAUTICA

BOLETIN DE INFORMACION ANTERIOR AL VUELO

VUELO Nº TAI- 110

AEROPUERTO DE DESTINO: MZBZ

AEROPUERTO ALTERNO: MSLP

EL PRESENTE ES UN RESUMEN DE NOTAM CLASE I Y CLASE II, VIGENTES AL 24 de mayo de 1988.

ESTE BOLETÍN TIENE COMO FINALIDAD INFORMARLE ACERCA DE LAS CONDICIONES DE UTILIZACIÓN DE AEROPUERTOS, RADIOAYUDAS, RUTAS ATS, ASÍ COMO DEL FUNCIONAMIENTO DE ÁREAS RESTRINGIDAS Y PELIGROSAS EN LA RUTA Y DEMÁS INFORMACIÓN DE CARÁCTER ESENCIAL PARA LA SEGURIDAD, ECONOMÍA Y EFICIENCIA DE LA NAVEGACIÓN AÉREA.

AEROPUERTO INTERNACIONAL EL SALVADOR, 24 DE mayo DE 1988

F. [redacted]

OFICIAL AIS RESPONSABLE

AMG/AGJ

417

41

COMISION EJECUTIVA PORTUARIA AUTONOMA
AEROPUERTO INTERNACIONAL EL SALVADOR

SERVICIO DE INFORMACION AERONAUTICA

BOLETIN DE INFORMACION AERONAUTICA ANTERIOR AL VUELO

L U G A R	INSTALACION, SERVICIO, RUTA Y OTROS	AVISO O INFORMACION VIGENTE
KMSY	PISTA 6/24 .	CON EFECTO INMEDIATO Y HASTA NUEVO AVISO CERRADA .

/agj.

COMISION EJECUTIVA PORTUARIA AUTONOMA
AEROPUERTO INTERNACIONAL EL SALVADOR

SERVICIO DE INFORMACION AERONAUTICA

BOLETIN DE INFORMACION AERONAUTICA ANTERIOR AL VUELO

L U G A R	INSTALACION, SERVICIO, RUTA Y OTROS	AVISO O INFORMACION VIGENTE
KMSY	VOR IDENTIFICADOR "MSY" .	CON EFECTO INMEDIATO Y HASTA NUEVO AVISO, NO UTILIZABLE .
KMSY	SISTEMA DE ILUMINACION DE APROXIMACION PISTA NUMERO 10 .	CON EFECTO INMEDIATO Y HASTA NO UTILIZABLE .

/agj.

4

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QU SALFDTA SALOCTA
.SALOCTA 241329

HOLD FOR CAP DARDON


241329?
FLT REL   IFR TAI110   BZE /MSY  240024  MACH:74    A/C N75356
               FUEL  TIME      CORR     TOGWT    LDGWT      AVG W/C
DEST MSY   010168 0202    . . . .   114068   103900    M021/M019
RESV       000906 0012    . . . .
ALTN       002136 0021    . . . .   ALTN BTR    DIST   0087  W/C M015
HOLD       007509 0030    . . . .
REQD       015719 0305    . . . .   ZFW   096900        PAYLOAD 024000
EXTRA      001448 0017    . . . .
TTL AT TO  017167 0322    . . . .   RTE   M3            DIST   0774


-N0435F350 DCT PIKRO UB753 MID UA770 GNI DCT PEPSI V9

                          M/H FL  TDV        MWL   WIND      COMP FF/E
TO          NM   AWY      M/C TAS G/S   ZT   ACTUE ETA ATA   ACBO ABO REM AREM

 N17558W088282            334 CLB ...         49    30010    .... 0509
PIKRO       030 DCT       335 ... ... 0/05 00/05 .../...   0009/... 0163/. .

 N18164W088364            335 CLB ...         49    30010    .... 0510
MMID/FIR 022 UB753        336 ... ... 0/04 00/09 .../...   0015/... 0156/. .

 N18230W088390            336 CLB ...         49    30010    .... 0510
PENSO       007 UB753     337 ... ... 0/01 00/10 .../...   0017/... 0154/. .

 -                        336 CLB ...         49    30010    .... 0509
TOC         048 UB753     337 ... ... 0/08 00/18 .../...   0032/... 0140/. .

 N20564W089393            332 350 P09         49    29053    M036 0241
MID         116 UB753     337 435 399 0/17 00/35 .../...   0046/... 0126/. .

 N21435W089420            346 350 P08         49    28062    M018 0239
MESNA       047 UA770     354 434 416 0/07 00/42 .../...   0051/... 0121/. .

 N23440W089490            345 350 P07         48    28072    M021 0237
ALARD       121 UA770     354 433 412 0/18 01/00 .../...   0065/... 0107/. .

 N24312W089506            346 350 P06         48    28070    M020 0235
KZHU/FIR 047 UA770        355 432 412 0/07 01/07 .../...   0070/... 0101/. .

 N25029W089516            346 350 P05         47    28067    M019 0234
KEHLI       032 A770      355 431 412 0/05 01/12 .../...   0074/... 0098/. .

 N28150W090014            346 350 P04         46    28058    M017 0230
DOLPH       192 A770      354 430 413 0/28 01/40 .../...   0095/... 0076/. .

 -                        348 350 P02         44    28044    M012 0226
TOD         013 A770      354 428 416 0/02 01/42 .../...   0097/... 0075/. .

 N29115W090045            347 DSC ...         44    28038    .... 0075
GNI         044 A770      354 ... ... 0/09 01/51 .../...   0099/... 0073/. .

 N29190W090112            314 DSC ...         42    28040    .... 0075
PEPSI       010 DCT       319 ... ... 0/02 01/53 .../...   0099/... 0072/. .

 N29313W090109            351 DSC ...         42    28040    .... 0075

24MAY1330
SAL05TA 6133
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OU SALFDTA SALOCTA
.SALOCTA 241329
-     - P A R T  2
N29313W090109        351 DSC ...        42    28040   .... 0075
GOING     012 V9     358 ... ... 0/02 01/55 .../... 0100/... 00727. .

N29596W090154        342 DSC ...        42    28040   .... 0075
MSY/A     034 V9     349 ... ... 0/07 02/02 .../... 0102/... 00707. .
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ALTERNATE

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N30018W090103        057 CLB ...        42    26021   .... 0691
MSY       010 DCT    059 ... ... 0/03 00/03 .../... 0117/... 00547. .

-                    286 CLB ...        42    26021   .... 0691
TOC       005 V114   290 ... ... 0/02 00/05 .../... 0121/... 00507. .

N30155W090440        288 120 P07        42    27032   M030 0296
VEILS     027 V114   290 363 333 0/05 00/10 .../... 0126/... 00467. .

-                    288 120 P07        42    27032   M030 0296
TOD       011 V114   290 363 333 0/02 00/12 .../... 0128/... 00447. .

N30291W091176        287 DSC ...        42    28040   .... 0120
BTR       021 V114   290 ... ... 0/07 00/19 .../... 0131/... 00417. .

N30320W091090        059 DSC ...        42    28040   .... 0120
BTR/A     013 DCT    064 ... ... 0/02 00/21 .../... 0132/... 00407. .

(FPL-TAI110-I
-B737/M-SXM/C
-MZB71600
-N0435F350 DCT PIKRO UB753 MID UA770 GNI DCT PEPSI V9
-KMSY0202 KBTR
-REG/N75356 SEL/NONE
 EET/MMID0009 KZHU0107


I CERTIFY THAT THIS FLIGHT IS DISPATCHED/RELEASED IN ACCORDANCE WITH
ALL APPLICABLE FAR 129 REGULATIONS
DISPATCHER ... .. .. .. .. ..
CAPT.. .. .. .. .. .. ..F/O .. .. .. .. .. .. .. .F/E. .. .. .. .. .. ..
F/A$. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. ..
CAPT SIGN .. .. .. .. .. .. .. .. .ACM/S.. .. .. .S/O/B.. .. .. .. ..


COMPUFLIGHT OPERATIONS SERVICE          RECALL:240356

24MAY1330
SAL05TA 6134
```

421

QU SALDATA
SALFDTA
CLR T/110/DATE N75356 SALBZE IFR BZE ALTN SAL
CLR T/110/DATE N75356 BZEMSY IFR MSY ALTN BTR/MOB
MIN FUEL OUT SAL 18000 LBS STOP IF POSS MAX STOP VALID TILL 2200Z
MIN FUEL OUT BZE ALONG WITH MAX FUEL IF POSS STP VALID TILL 2200Z

REST INFO ATTACHED

DISPATCHER/EVILLALTA

CAP DARDANO.------------------------------F/O LOPEZ.-----------------
CAP SIG.------------------ACM/S.---------------S/O/B.----------------

KL 4-22

OU SALFDTA
.MRYWXXH TA/ 240830
TACA3
*MSY SP 0816 8 SCT 55 SCT 7 2109/986
MSY SA 0751 CLR 7 111/71/71/2407/986/ 98774
MSY SA 0652 CLR 7 112/72/72/2308/986
MSY SA 0552 CLR 7 117/73/72/2409/988/ 003 88
FMSY FT 240808 CLR 2308. 12Z 80 SCT 2412 OCNL C80 BKN. 16Z 30 SCT 80

SCT 2512 CHC TRW. 02Z VFR..
NMSY 05/011 MSY 1-19 CLSD EFF 241330-1630
NMSY 11/005 MSY ILS MM 28 OTS
NMSY 03/007 MSY ALS 10 OTS
BTR SA 0751 CLR 15 108/69/65/2206/985/ HAZY
BHM SA 0750 M37 BKN 65 OVC 5RW-F 102/63/63/2606/985/RB18
/ 98598
JAN SA 0750 E80 OVC 7 086/65/63/1808/980/RE05/ 98663
LFT SA 0750 CLR 7 108/71/68/2405/985
LCH SA 0750 80 SCT 15 110/75/71/2213/986/98822
MEM SA 0751 M9 OVC 6R-F 063/64/64/2610/972 RB56
MEI SA 0752 E75 OVC 7R- 104/63/61/1904/984/RB40
MOB SA 0753 CLR 10 112/69/68/2205/987
MLU SA 0753 E75 OVC 10 079/69/64/2303/977
MEM SA 0751 M9 OVC 6R-F 063/64/64/2610/972 RB56
NEW SA 0750 CLR 10 112/72/69/2012/986/FEW CI
PNS RS 0749 M11 BKN 25 BKN 7 121/75/71/2111/989
SHV SA 0750 E60 BKN 15 088/66/61/2405/980/ 98714

203

FACA KMIA 240304

240600-241800

ATLANTIC/CARIBBEAN W OF 57W AND S OF 32N GULF OF MEXICO N OF 23N

AND FLORIDA SFC-400MB

SYNOPSIS

NO SIGNIFICANT FEATURES.

SIGNIFICANT CLD/WX

GULF OF MEXICO S OF 26N BTN 87W/92W 10-20 BKN/OVC LYR TO ABOVE 240.

SCT TS IN CLUSTERS. AREA MOV LITTLE AND WKN BY 12UTC.

ATLANTIC/CARIBBEAN/REMAINDER GULF OF MEXICO 20-30 SCT LOC BKN 80-120

SCT LOC BKN. ISOL RASH/TS EXC SCT TS LARGER ISLANDS AFT 16UTC.

GULF OF MEXICO COAST/FLORIDA OCNL VIS BLW 3ST/FG N OF 28N TIL 14UTC

OTHERWISE VSBY 3-5FG 10UTC-13UTC. AFTER 14UTC 25-40 SCT/BKN 70-100

SCT/BKN. WIDELY SCT RASH/TS.

XXSH/TS IMPLY CEILING BLW 10 AND/OR VIS BLW 3 NM.

ICE

MOD/SEV IN TCU/CB TOPS ABOVE FZ LEVEL. FZ LEVEL NEAR 120 ATLANTIC

SEGMENT 1 OF MESSAGE. MORE TO COME.
24MAY1217
SAL05TA 6103

QU SALFDTA
.MRYWXXH TA/ 240830
ALONG 32N AND NW GULF OF MEXICO SLOPING TO NEAR 140 NEAR 25N AND

160 CARIBBEAN.

TURB

MOD/SEV NEAR XXSH/TS.

OUTLOOK 241800-250600

RASH/TS DIMINISHING TO ISOL FLORIDA/GULF OF MEXICO COAST AND LARGER

ISLANDS BY 04UTC. OTHERWISE LITTLE CHANGE.

.DATA BASED ON 240000Z

VALID 250000Z FOR USE 1800-0500Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 3900
0

MSY 2719 2824 13 2734 07 2738 02 2837-11 2846-23 286040 286248 28595
5
SEGMENT 2 OF MESSAGE. MESSAGE ENDS.
24MAY1217
SAL05TA 6105

M008

TX-ARC 1252 UTC 05/24/88
QU MSYOATA BZEOATA
.SALFDTA 241252 241254
CLR TA-111/24 N-75356A INRTE MSYBZE IFR BZE ALTN SAL
CLR TA-111/24 N-75356A INRTE BZESAL IFR SAL ALTN GUA
MAX FUEL AS PER FLRT PLAN VALID TILL 0400Z
SYNOPSIS SCTD CNVTVS ZNS OVR WHOLE AREA
SIG WX SCTD ST 600TO 800 SCTD OCNLY BRKN CU/SC 2500 TO 3800
SCTD 80000 TO 10000 SCTD TCU/CBS TOPS UP TO 20000 TO 25000 WITH SCTD
RAIN/SHWRS AND THUNDERSTORM LATE AFTRN AND EVE NGT HRS VSBLY BLO 2
KMS IN PCPN SMK/HZE FOG ERY MRNG HRS OVR VLLYS LGT TO MDT TURBLC
FRZNG LVL 15500 TO 16500 FTS
TERMINALS FCST VALID TILL 0400Z
BZE 090/06 VIZ UNL SCTD CU/SC 2000 BRKN CU/SC 2400 TEMPO 0400
GUA 180/10 VIZ 9 KMS HZE BRKN SC 1800 PROB15 RAIN THUNDERSTORM
SAL BRV06 8000 06HZ 4SC043 PROB15 17TS/80RASH 1CB043 TEMPO 0612 36006
3SC043 2AC160 GRADU 1719 22012 8000 06HZ 5CU043
I CERTIFY THAT THIS FLIGHT IS DISPATCHED/RELEASED IN ACCORDANCE WITH
ALL APPLICABLE FAR 129 REGULATIONS
CPTN SILVA F/O RAMIREZ

CPTN SIGN .... ACM/S .... S/O/B ......

DISPATCHER: ESCOBAR/G
PLS ACK TIME RCVD THIS MSG
SALFDTA/ESCOBAR

007 05241253

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